EXHIBIT 1: Documents Produced by DCI

Maxine Disposal Area Mr. Edwards

December 8, 1983

Mr. Richard Simon
Supervisor - Technical Mining Analysis
Southern Company Services, Inc.
P. O. Box 2625
Birmingham, Alabama 35202

Dear Rick:

This is to confirm the conversation we had on December 5, 1983 relative to the current status of reclamation in the hollow below the old refuse (preparation plant reject) disposal area at Maxine Mine.

The pollution abatement plan for runoff from the refuse disposal area consisting of diversion ditches and limestone filters was approved by the Alabama Water Improvement Commission, currently identified as the Alabama Department of Environmental Management (ADEM), on August 25,1 1981 and completed according to the approved plan on October 29, 1981.

To satisfy the surface mine rules and regulations as published by the Alabama Surface Mining Commission we have completed reclamation of the area on which refuse had been deposited since the enactment of the 1977 Surface Mine Law with the understanding that the previously completed limestone filters would satisfy the ADEM's requirements for prelaw refuse disposal areas.

Due to external pressure, ADEM has informed us verbally that we may be required to obtain an NPDES permit for the outflow through the limestone filter and as such, the outflow would have to meet water quality standards.

We informed the ADEM staff during a meeting at their office on September 6, 1983 that we had no intention of spending enormous sums to treat the water since previously approved pollution abatement plans had been completed and since investigations had proven that the outflow had negligible impact on the river.

REC'D DEC 9 1983

As of this date, we have not received a written notification that ADEM will require the NPDES permit. You will be advised of any new developments to this matter.

D. R. Cook

DRC:cc

bcc: Mr. Sheriff/Mr. Burdette
Mr. Musick
Mr. Edwards
Mr. Jones

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
APPROVAL OF PLANS

28 May , 19 74

SAMOP-SP 73-134

Alabama By-Products Corporation
P. O. Box 10246
Birmingham, Alabama 35202

Gentlemen:

Referring to written request dated 9 March 1973 for the approval of the attached plans of a 10 ft. high x 34 ft. wide x 1185 ft. long rock retaining wall. Approximately 19,200 cu. yds. of mine breaker rock has been used to construct the wall in accordance with the final decree of the Circuit Court for the Tenth Judicial Circuit of Alabama, to correct a condition in Maxine Lake, caused by applicant's mining operation,

which has been constructed in Locust Fork of Black Warrior River (Mi 391)

at Jefferson County, Alabama

Upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and

ENG FORM 96C
MAY 1970

for other purposes," said plans are approved by the Secretary of the Army, subject to the following conditions:

(a) That this instrument does not convey any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State or local laws or regulations, nor does it obviate the necessity of obtaining State or local assent required by law for the structure or work herein approved.

(b) That the permittee shall comply promptly with any lawful regulations, conditions, or instructions affecting the structure or work herein approved if and when issued by the Federal Water Quality Administration and/or the State water pollution control agency having jurisdiction to abate or prevent water pollution, including thermal or radiation pollution. Such regulations, conditions or instructions in effect or hereafter prescribed by the Federal Water Quality Administration and/or the State agency are hereby made a condition of this permit.

(c) That the permittee will maintain the structure herein approved in good condition in accordance with the approved plans.

(d) That this permit may at any time be modified by authority of the Secretary of the Army if it is determined that, under existing circumstances, modification is in the public interest.* The permittee, upon receipt of a notice of modification, shall comply therewith as directed by the Secretary of the Army or his authorized representative.

(e) That this permit may be revoked by authority of the Secretary of the Army if the permittee fails to comply with any of its provisions or if the Secretary determines that, under the existing circumstances, such action is required in the public interest.*

(f) That any modification or revocation of this permit shall not be the basis for a claim for damages against the United States.

(g) That the United States shall in no way be liable for any damage to any structure or work herein approved which may be caused by or result from future operations undertaken by the Government in the public interest.

(h) That no attempt shall be made by the permittee to forbid the full and free use by the public of all navigable waters at or adjacent to the structure or work herein approved by this permit.

(i) That if the display of lights and signals on any structure or work herein approved is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard, shall be installed and maintained by and at the expense of the permittee.

(j) That the legal requirements of all Federal agencies be met.

(k) That this permit does not approve particular structures, the authorization or approval of which may require action by the Congress or other agencies of the Federal Government.

(l) That all the provisions of this permit shall be binding on any assignee or successor in interest of he permittee.

(m) That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

(n) That the permittee, upon receipt of a notice of revocation of this permit, shall, without expense to the United States, at the direction of the Secretary of the Army and in such time and manner as the Secretary or his authorized representative may direct, restore the waterway to its former condition. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

*A judgment as to whether or not suspension, modification or revocation is in the public interest involves a consideration of the impact that any such action or the absence of any such action may have on factors affecting the public interest. Such factors include, but are not limited to navigation, fish and wildlife, water quality, economics, conservation, aesthetics, recreation, water supply, flood damage prevention, ecosystems and, in general, the needs and welfare of the people.

BY Authority of the Secretary of the Army:

1 Incl
Dwg (2 sheets)

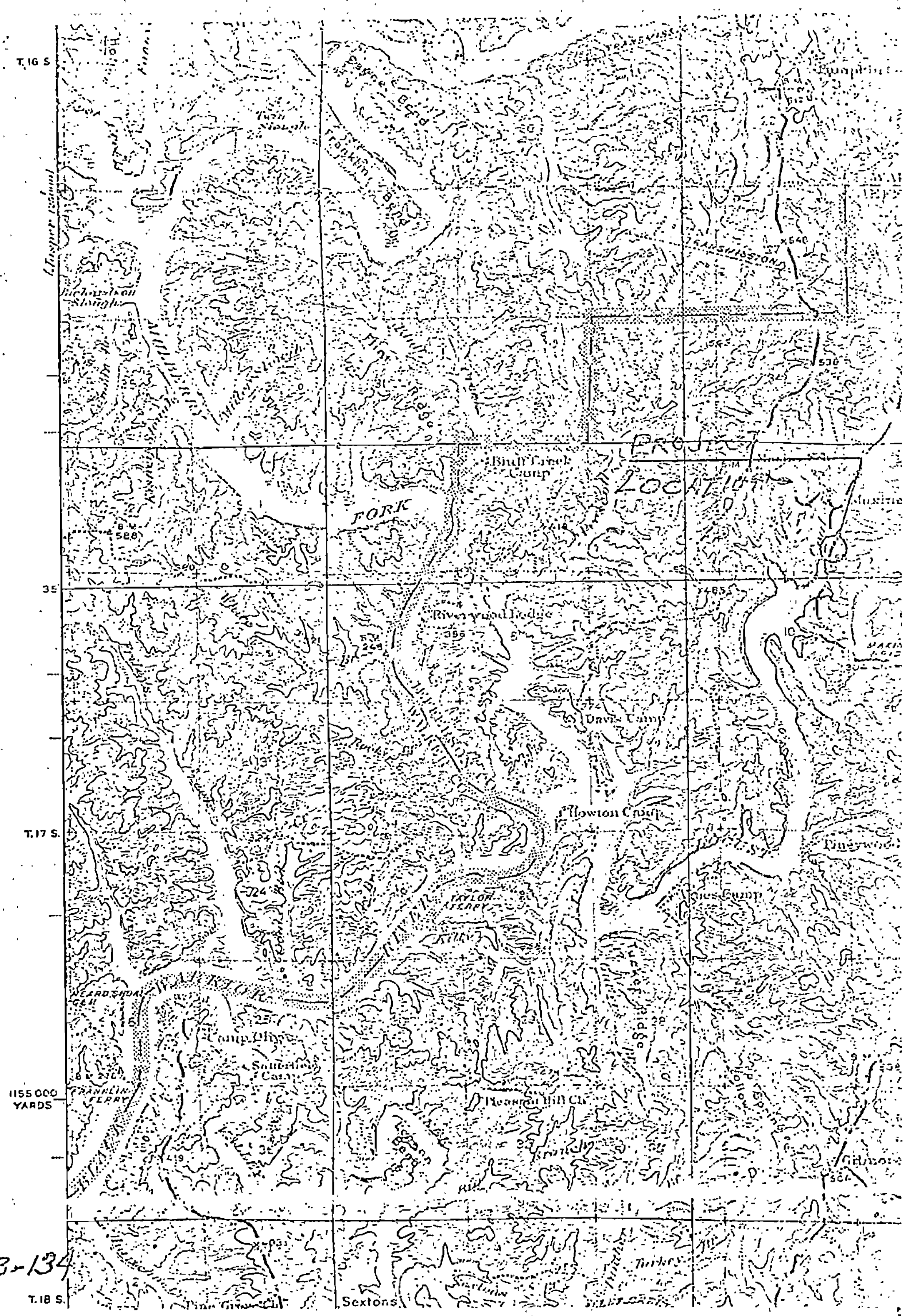
DRAKE WILSON
COL, Corps of Engineers
District Engineer

28 May 1974
Date

Permittee hereby accepts the terms and conditions of this permit.

ALABAMA BY-PRODUCTS CORPORATION
BY: W. C. Jones, Executive Vice Pres.
Permittee

5-24-74
Date


T. 16 S
35
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YARDS
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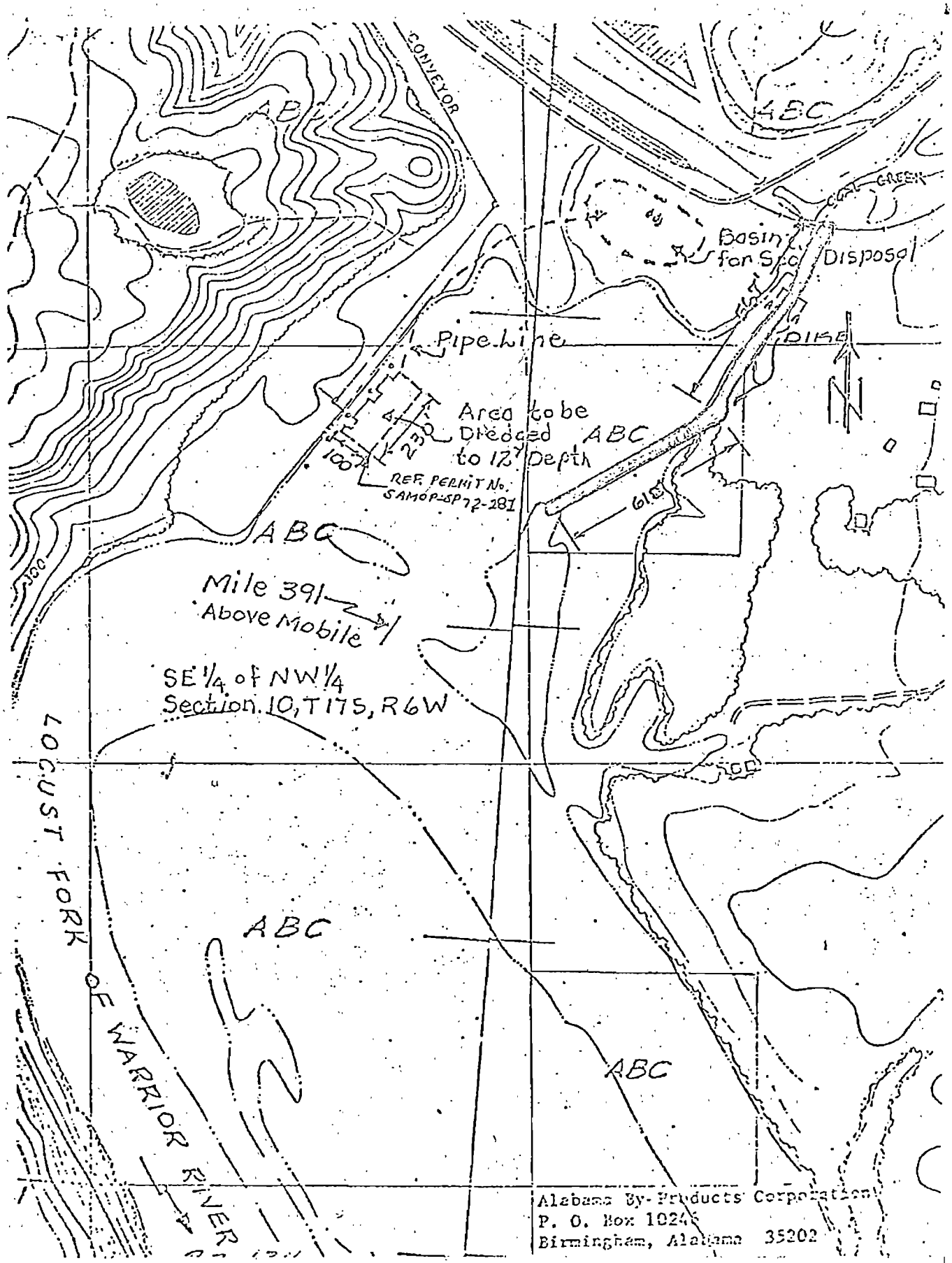
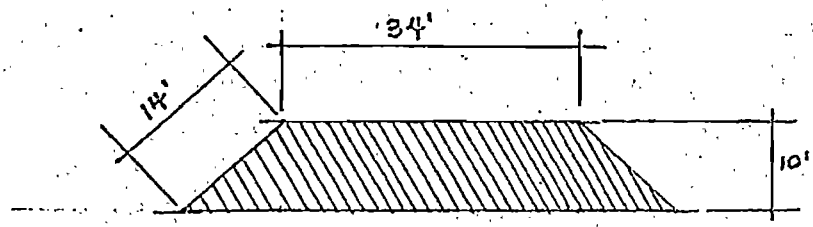
PROJECT
LOCATION
Bluff Creek
Camp
FORK
Riverwood Lodge
Davis Camp
Camp Oliver
Pleasant Hill Ch
Sextons
Taylor
Ferry
Franklin
Ferry
Twin
Sloughs
B.M.
588

73-134


CONVEYOR
ABC
Basin for S.C. Disposal
Pipeline
DIKE
Area to be Dredged to 12' Depth
ABC
REF. PERMIT No. SAMOP-SP72-281
ABC
Mile 391 Above Mobile
SE 1/4 of NW 1/4 Section 10, T17S, R6W
LOCUST FORK OF WARRIOR RIVER
ABC
ABC
Alabama By-Products Corporation
P. O. Box 1024
Birmingham, Alabama 35202

DRUM000114



CROSS SECTION
of
COAL CREEK DIKE

SECTION A-A

T2. 15N

cc: Mr. Lewis
Mr. W.E. Self
Mr. Breland
Mr. Cook
Mr. Musick
Mr. Bradford

March 18, 1974

MEMO TO FILE:

I received a call this morning from Mr. Bob Smith of the AWIC in regards to the dike which was constructed at the Maxine Mine-Winters Slough area. Mr. John Williford of the AWIC had received a phone call from the Corps of Engineers requesting certification of this construction and what Mr. Smith had wanted to know was the approximate dates of construction, etc. I informed Mr. Smith that I would get this information and call back. He then suggested I call directly to Mr. Williford, which I did.

In talking with Mr. Williford he stated that when he received copies of correspondence between the Corps and ABC and noted a reference to a permit application number he assumed that the Corps did not plan to issue a joint public notice with the AWIC for this permit and he therefore filed the correspondence without further action on his part. He said he was aware of the law suit and the conditions under which this dike was built and since it was in a non-navigable area he had no concern about its construction. He was to have further contact with the Corps and stated that the AWIC doesn't normally certify something "after the fact" but the Corps of Engineers will issue permits in this manner.

We should not have a problem with this matter, he feels, and that this request is simply to complete action on the permit application.

MOYER B. EDWARDS

MBE:1

ALABAMA STATE DOCKS DEPARTMENT AN AGENCY OF THE STATE OF ALABAMA
TWX 810 741-7748
P.O.BOX 1588
MOBILE,ALABAMA 36601

March 23, 1973

Copy 3/28/73 from TEM to:

Mr. Koenig
Mr. Hager - Mr. Lewis
Mr. W. E. Self
Mr. Breland
Mr. Cook
Mr. Edwards
Mr. Bradford
Mr. Brown
Mr. Keith

(Mr. Murray Alley
(Mr. Fournier J.Gale,II
Cabaniss & Johnston

Alabama By-Products Corporation
P. O. Box 10246
Birmingham, Alabama 35202

Attention: Mr. T. E. Musick
Asst. Chief Mining Engineer

Gentlemen:

You are hereby licensed to construct a dike, located in the slough off of the Locust Fork of the Warrior River at or near Mile 391 above Mobile, in Jefferson County, Alabama, in a manner and at the location as described in your letter dated March 9, 1973, and the drawings attached thereto.

This license merely concerns the public's rights of navigation and has no connection with property rights.

This license is issued subject to the approval of the U. S. Corps of Engineers, the Alabama Water Improvement Commission and in accordance with the final decree of the Circuit Court for the Tenth Judicial Circuit of Alabama, in Equity, Case No. 167-376.

For the Director:

W. H. Black, Jr.
Chief Engineer

WHB/md

bcc: Mr. Koenig
Mr. Hager - Mr. Lewis
Mr. W. E. Self
Mr. Breland
Mr. Cook
Mr. Edwards
Mr. Bradford
Mr. Brown
Mr. Keith

Mr. L. Murray Alley
Mr. Fournier J. Gale, III

March 28, 1973

District Engineer
U. S. Army Corps of Engineers
Mobile District
P. O. Box 2288
Mobile, Alabama 36628

Attention: Mr. F. F. Stevens
Chief, Permits & Statistics Branch

Gentlemen:

Re: SAMOP-SP Ref: 73-134

Supplementing our letter dated 9 March 1973 applying for a Department of the Army permit to construct a dike in the slough off Locust Fork at Mile 391, Birmingham, Alabama, and in compliance with your request for certain additional information in connection therewith, we submit herewith the information noted on your checklist.

The names and addresses of adjacent property owners, to the best of our knowledge, information and belief, are as follows:

Alabama By-Products Corporation (Applicant) P. O. Box 10246, Birmingham Alabama 35202
Jack M. Myers, Route 1, Quinton, Alabama
Norman A. Jett, Route 1, Box 141-A1, Quinton, Alabama 35130

The quantity of source of material used in the dike is approximately 19,200 cubic yards of mine breaker rock.

We trust that this additional information will be sufficient for you to proceed with the processing of our application.

Sincerely yours,

T. E. Musick

T. E. Musick
Assistant Chief Mining Engineer

TEM:JPB/mcb

Mr. W.E. Self

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2288
MOBILE, ALABAMA 36628

REPLY TO
ATTENTION OF:

SAMOP-SP REF: 73-134 14 March 1973

Alabama Py-Products Corporation
P. O. Box 10246
Birmingham, Alabama 35202

Gentlemen:

Reference is made to your letter dated 9 March 1973 applying for a Department of the Army permit to construct dike in slough off Locust Fork at Mile 391, Birmingham, Alabama.

Your application is being reviewed for compliance with existing regulations. As soon as this is completed, notice of your application will be issued to the public, or you will be required to furnish additional information.

The application has been assigned No. 73-134. If you should have occasion to contact this office concerning this application, either verbally or in writing, it would be appreciated if you would refer to this number in all communications.

Please feel free to call on us if you have any questions concerning your application.

Sincerely yours,

F. F. Stevens

F. F. STEVENS
Chief, Permits & Statistics Branch
Operations Division

Copy 3/19/73 from TEM to:

Mr. Koenig
Mr. Hager/Mr. Lewis
Mr. W. E. Self
Mr. Breland
Mr. Cook
Mr. Edwards
Mr. Bradford

I will supply information on 3/26/73.
T.E.M.

MOB FL 508
5 Feb 73

ALABAMA BY-PRODUCTS CORPORATION
FOUNDRY COKE • COAL • COAL CHEMICALS

COAL DIVISION OFFICE
P. O. BOX 218
GOODSPRINGS, ALABAMA 35560

PHONE (205) 252-8342
TELEX NO. 59-810

THOMAS E. MUSICK
CHIEF MINING ENGINEER

May 24, 1984

Mr. Virgil Willett
Alabama Surface Mining Commission
Post Office Box 2390
Jasper, Alabama 35501

Attention: Mr. Randy Johnson

Dear Sir:

Re: Maxine Mine
Rock Disposal Area

Enclosed for your review and file are two (2) copies of a progress report on the reclaimed washer rock disposal site at Maxine Mine. This information was collected and prepared in report form by P. E. LaMoreaux and Associates and is entitled "Maxine Rock Disposal Area Surface and Ground-Water Monitoring." The report contains the annual compilation of hydrologic and geologic information collected to date. As previously discussed, a final report will be submitted at the completion of the project.

The report appears to be self-explanatory but if you have any questions about it or need additional copies, please let me know.

Sincerely yours,

T. E. Musick

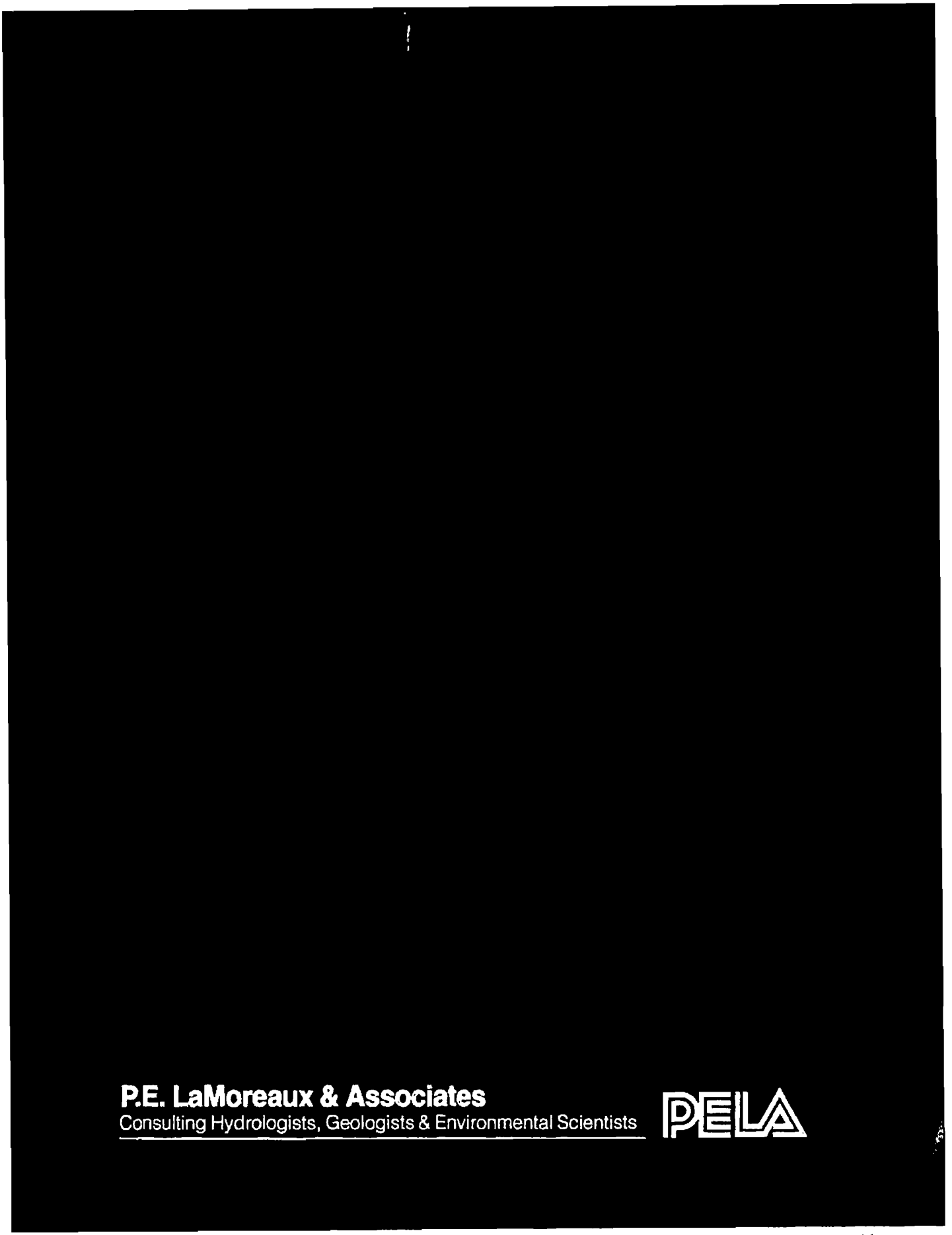
T. E. Musick
Chief Mining Engineer

TEM:EA

Enclosure

bc: Mr. Sheriff/Mr. Burdette
Mr. Cook
Mr. Darden
Mr. C. Jones
Mr. F. McDuff) Letter only
Ms. L. George)
Mr. M. Edwards ✓
Mr. J. McDuff

RECEIVED
MAY 25 1984
A. B. C.
ENV. CONTROL


P.E. LaMoreaux & Associates
Consulting Hydrologists, Geologists & Environmental Scientists
PELA

PELA

MAXINE ROCK DISPOSAL AREA

SURFACE- AND GROUND-WATER MONITORING

(PELA File 436200)

Prepared for

Alabama By-Products Corporation
Post Office Box 218
Goodsprings, Alabama 35560

(11/3/83)

Prepared by

P. E. LaMoreaux and Associates, Inc.
Consulting Hydrologists, Geologists
and Environmental Scientists
Post Office Box 2310
Tuscaloosa, Alabama 35403
(205) 752-5543

April 5, 1984

P.E.LaMoreaux & Associates

PELA

CONTENTS

PELA

ILLUSTRATIONS

INTRODUCTION

This report contains the annual compilation of hydrologic and geologic information collected for the Maxine Rock Disposal Area by P. E. LaMoreaux and Associates, Inc. (PELA). The logs and construction diagrams for wells MO-3 and MO-4, drilled during the first phase of investigative activities, are contained in Appendix I. Lithologic logs of MO-5 through MO-9 are contained in Appendix II. The results of percolation tests in "pre-law" materials are given in Appendix III.

MONITOR WELL DRILLING

The installation of wells for the purpose of monitoring water level fluctuations and collection of water samples was completed in two phases.

Monitoring wells MO-3 and MO-4 were installed in January 1983. Lithologic logs and construction diagrams are included in Appendix I. Drilling and construction of five monitoring wells (MO-5, MO-6, MO-7, MO-8, and MO-9) at the Maxine rock disposal area were completed July 29, 1983. All well locations are shown on figure 1.

Monitoring wells MO-3, MO-4, MO-5, and MO-6 were drilled in the "pre-law" refuse, upgradient and downgradient from the capped area. Monitor wells MO-7, MO-8, and MO-9 were drilled in the capped area.

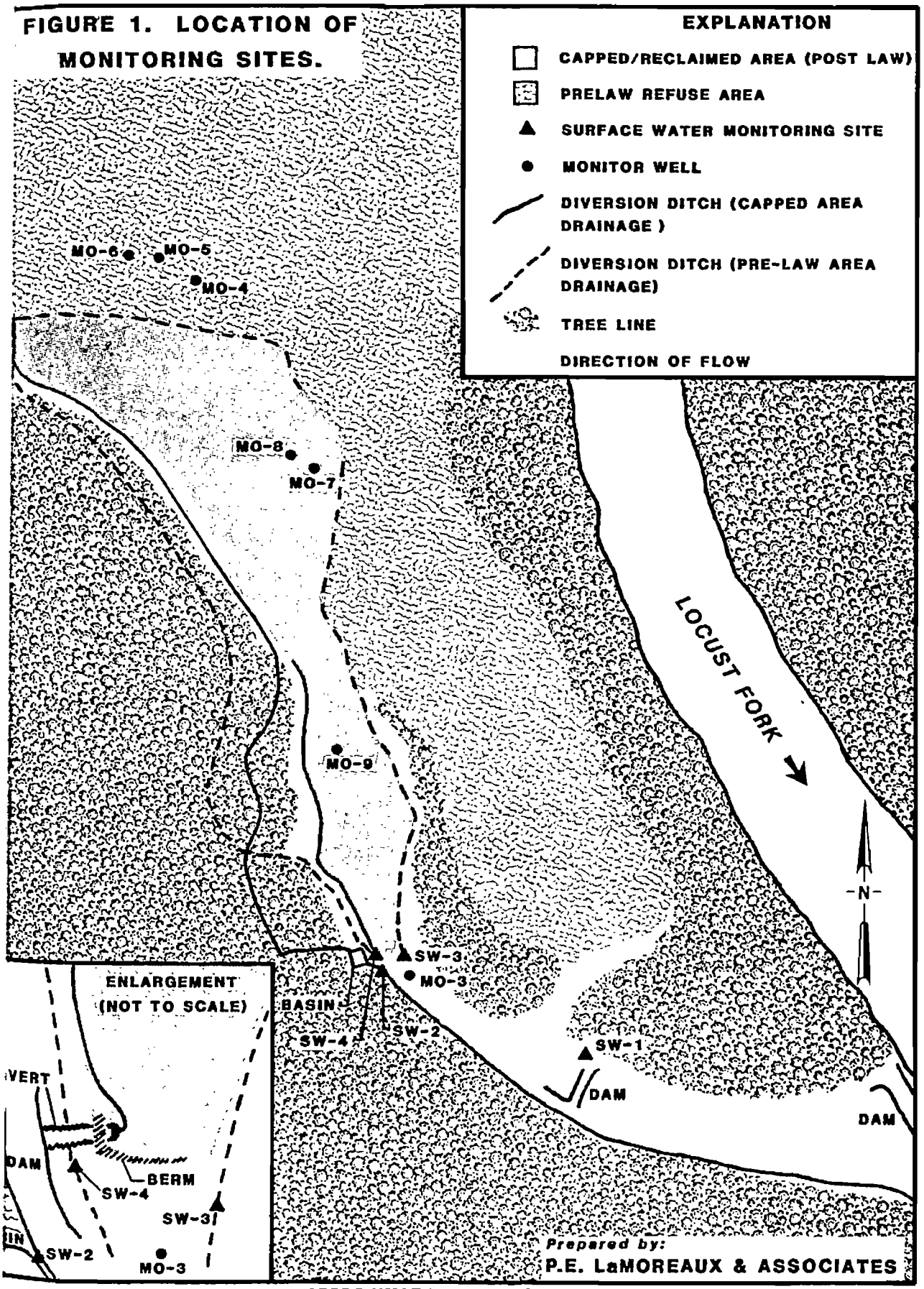


FIGURE 1. LOCATION OF MONITORING SITES.
EXPLANATION
CAPPED/RECLAIMED AREA (POST LAW)
PRELAW REFUSE AREA
SURFACE WATER MONITORING SITE
MONITOR WELL
DIVERSION DITCH (CAPPED AREA DRAINAGE)
DIVERSION DITCH (PRE-LAW AREA DRAINAGE)
TREE LINE
DIRECTION OF FLOW
MO-6
MO-5
MO-4
MO-8
MO-7
MO-9
LOCUST FORK
N
SW-3
MO-3
SW-2
SW-4
SW-1
DAM
DAM
BASIN
ENLARGEMENT
(NOT TO SCALE)
VERT
DAM
BERM
SW-4
SW-3
SW-2
MO-3
Prepared by:
P.E. LaMOREAUX & ASSOCIATES

DRUM000152

METHODOLOGY

The wells MO-5, MO-6, MO-7, MO-8, and MO-9 were drilled with 6-inch hollow stem augers. Samples were collected at various intervals by a split spoon sampler (18 inches in length). Samples were retained and detailed descriptions completed. Descriptions are given in Appendix II.

Wells MO-5 and MO-6 were drilled to locate and verify existence of a valley filled with "pre-law" refuse. Well MO-5 was drilled to a total depth of 80 feet. The contact between the bottom of the refuse material and top of the buried soil zone was 76 feet. A wet clay layer was observed at 78 feet below land surface. Well MO-5 was cased with slotted PVC casing from 2 feet to 80 feet below land surface, the bottom of the slotted PVC casing was capped. A solid section of PVC casing was installed from 2 feet below land surface to above land surface (fig. 2).

Well MO-6 was drilled to a depth of 75 feet below land surface. The contact between the refuse material and the buried soil zone was at 74 feet below land surface. The lower 3.5 feet of the well had filled in due to caving. Well MO-6 was cased with slotted PVC casing from 2 feet below land surface to 71.5 feet below land surface (where the casing was capped). A solid section of PVC casing was installed from 2 feet below land surface to above land surface (fig. 3).

Wells MO-7 and MO-8 were drilled and constructed to compare water movement and quality in the "pre-law" refuse to that in the "post-law" refuse. The two wells were drilled in an upgradient position in the capped area.

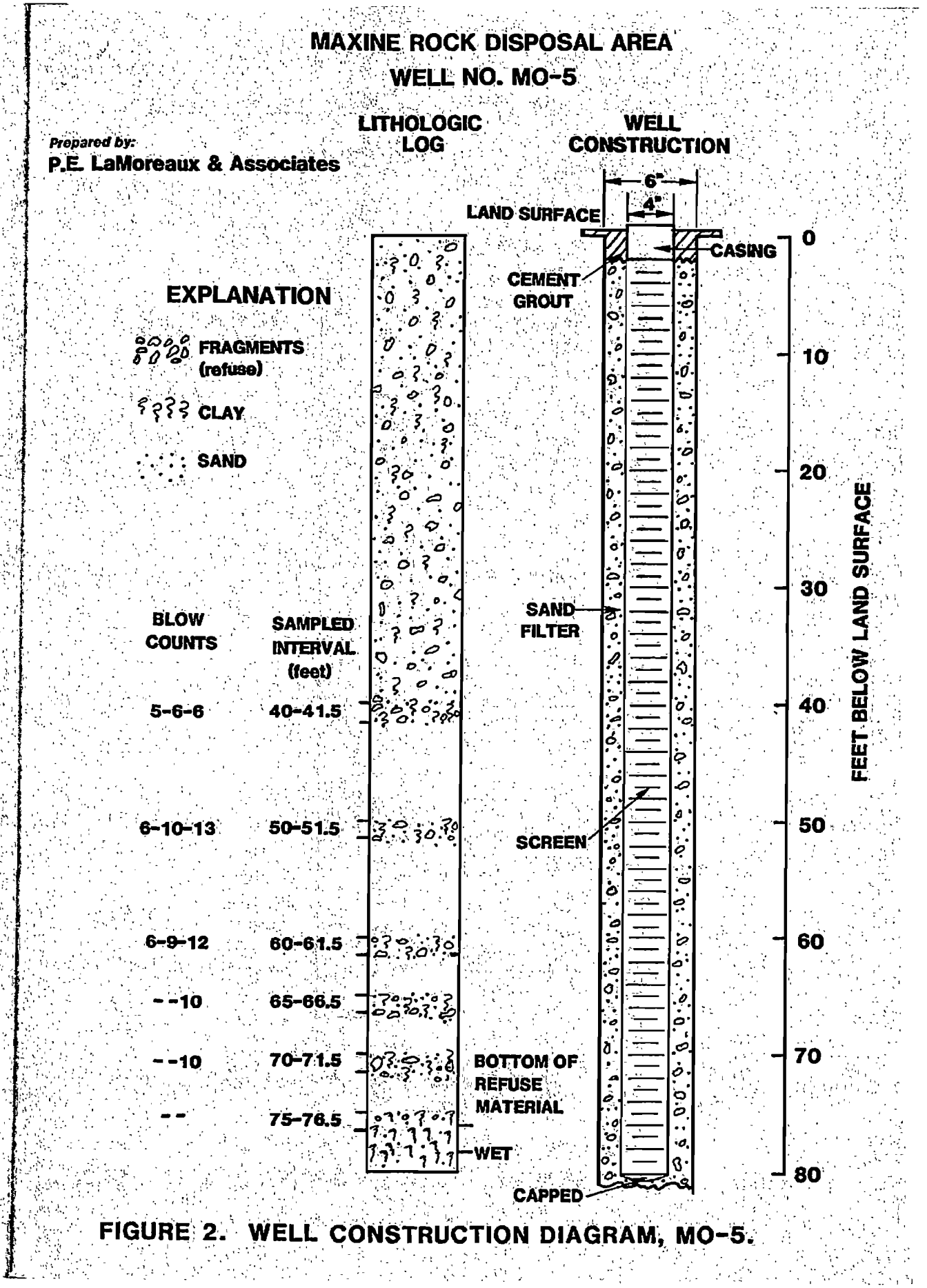


FIGURE 2. WELL CONSTRUCTION DIAGRAM, MO-5.

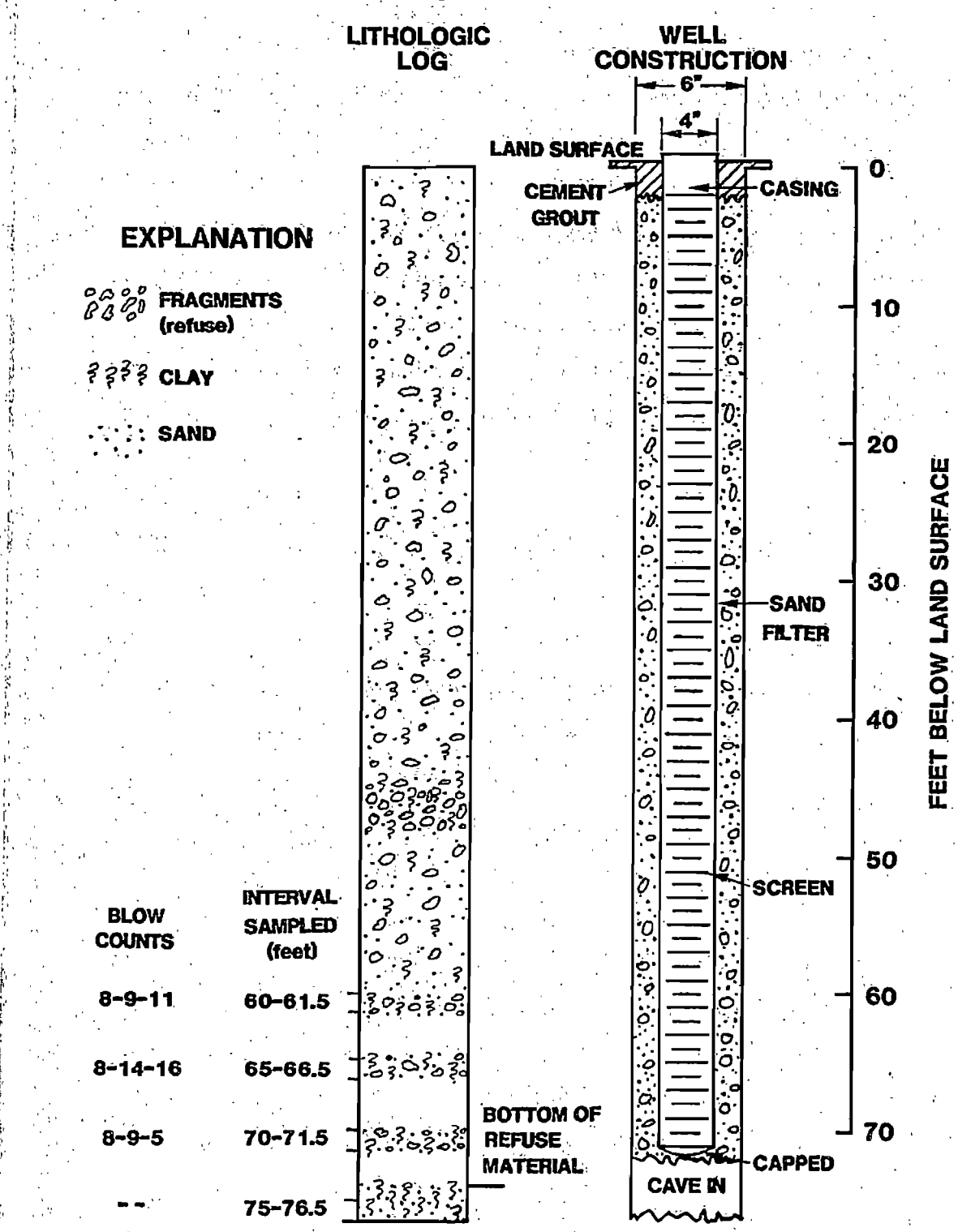


FIGURE 3. WELL CONSTRUCTION DIAGRAN DIAGRAM, MO-6.

Well MO-7 was drilled with 6-inch hollow stem augers and sampled continuously with the split spoon to define the contact between the "pre-law" and "post-law" refuse material (16.5 feet below land surface). Well MO-7 was drilled to a depth of 63 feet below land surface. The contact between the refuse material and the buried soil zone was at 62.5 feet below land surface. Caving of the walls filled the lower 4.5 feet of the well. Well MO-7 was cased with slotted PVC casing from the contact between the "post-law" and "pre-law" refuse material to 58.5 feet below land surface (where the casing was capped). A solid section of PVC was installed from the "post-law"/"pre-law" contact to above land surface (fig. 4).

Well MO-8 was drilled to a depth of 17 feet below land surface; 0.5 feet below the "post-law"/"pre-law" contact. Caving of the walls filled the lower 1.5 feet of the well. Well MO-8 was cased with slotted PVC casing from 15.5 feet below land surface (where the casing was capped) to 2 feet below land surface. A solid section of PVC was installed from 2 feet to above land surface (fig. 5).

Well MO-9 was drilled at a downgradient position in the capped area. The contact between the "post-law" refuse and the top of the valley fill (alluvial material -- transported "pre-law" refuse) was at 41 feet. Well MO-9 was drilled to a total depth of 45 feet to compensate for anticipated caving. Well MO-9 was cased with slotted PVC casing from 41 feet below land surface (where the casing was capped) to 3.5 feet below land surface. A solid section of PVC was installed at 3.5 feet below land surface to above land surface (fig. 6).

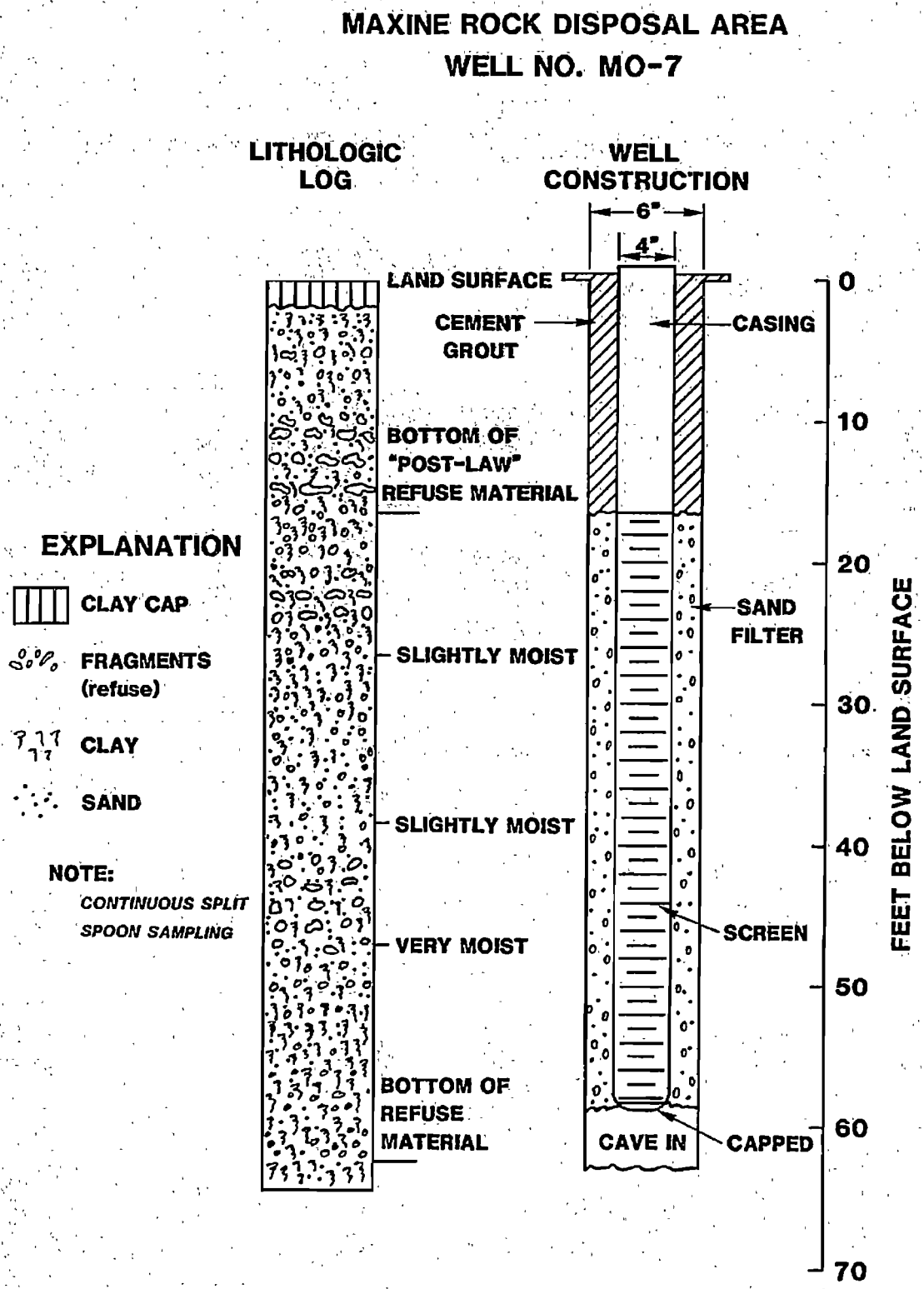


FIGURE 4. WELL CONSTRUCTION DIAGRAM, MO-7.

MAXINE ROCK DISPOSAL AREA WELL NO. MO-8

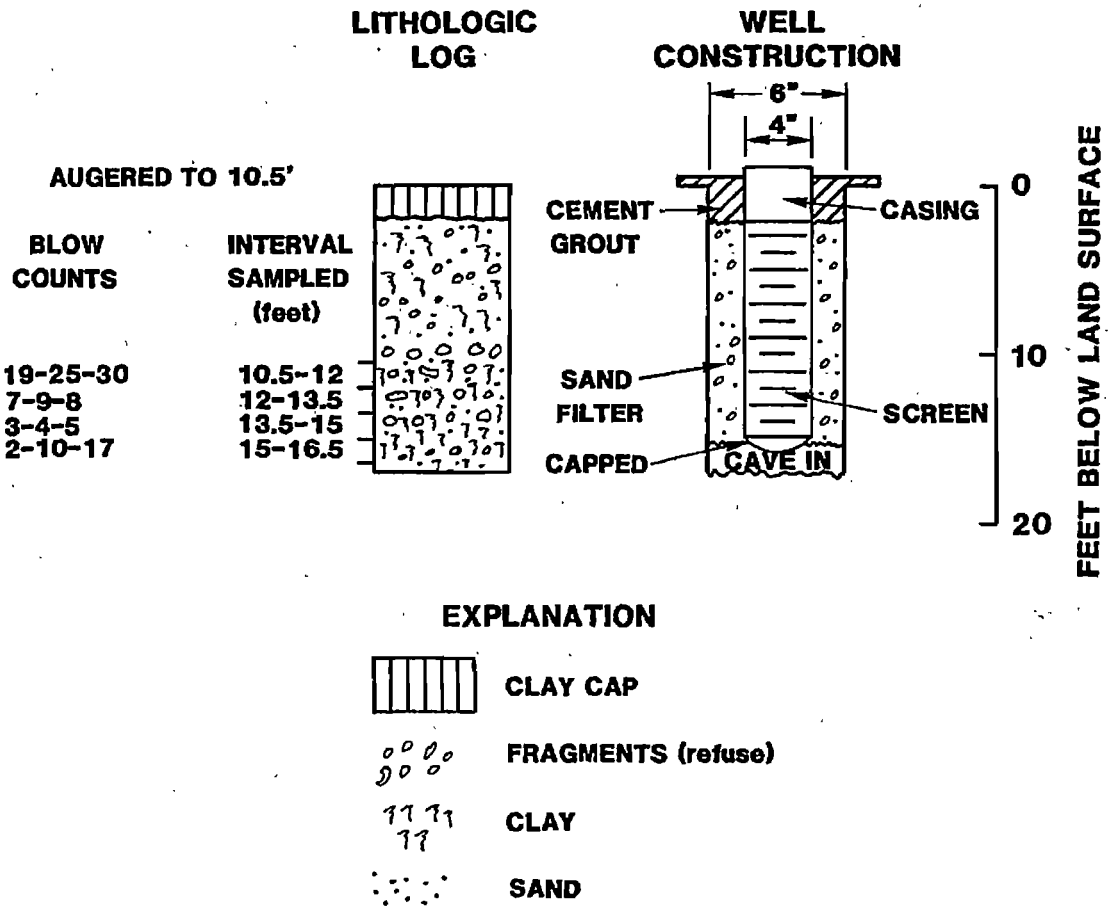


FIGURE 5. WELL CONSTRUCTION DIAGRAM, MO-8.

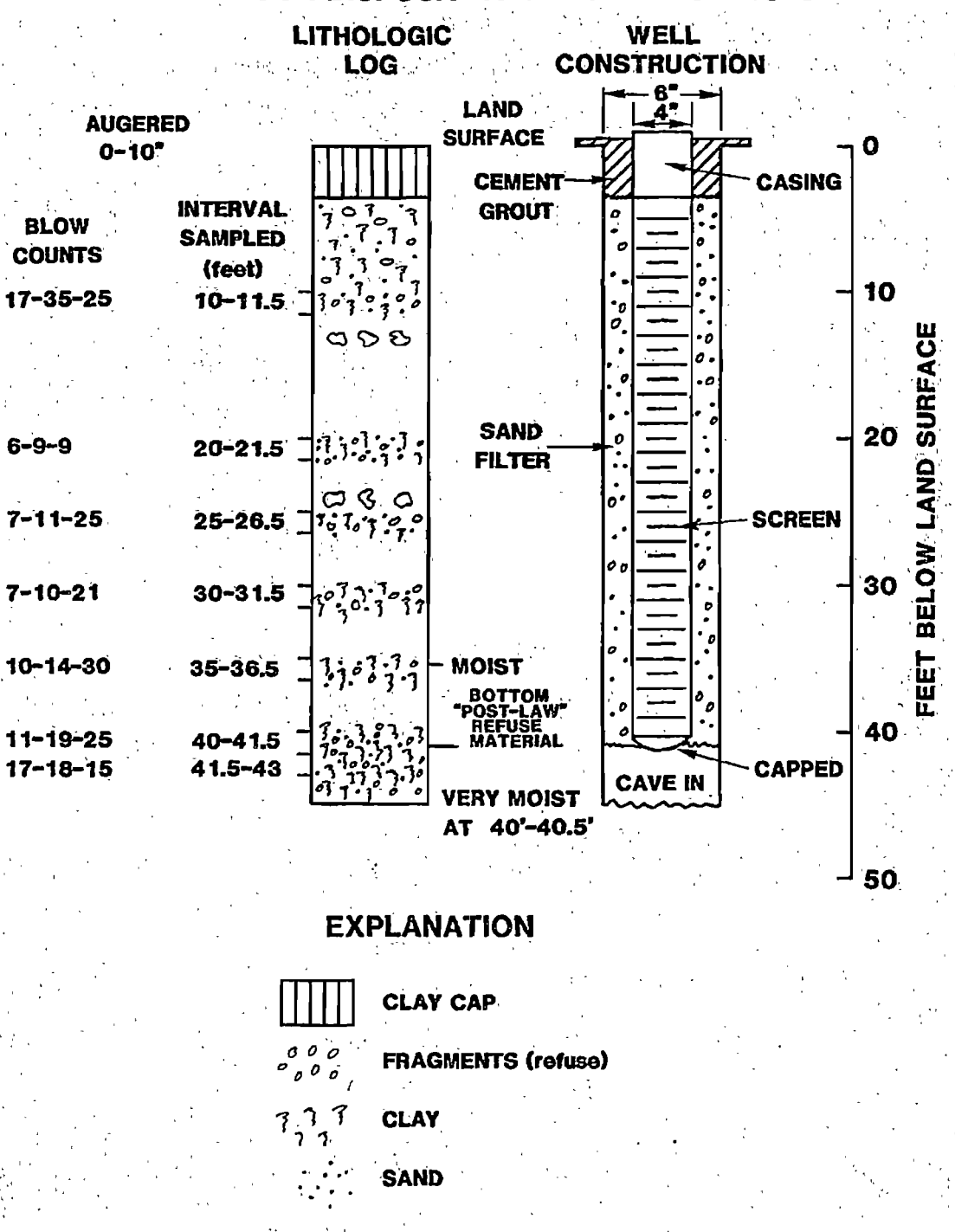


FIGURE 6. WELL CONSTRUCTION DIAGRAM, MO-9.

In all the wells the annular space between the slotted PVC and the wall of the drilled hole was packed with filter sand. The annular space between the solid PVC and the wall of the drilled hole was grouted.

MONITORING

Wells MO-5 and MO-6 were installed to monitor the water-level fluctuations and water quality of ground water in (when or if occurring) the "pre-law" refuse, upgradient from the capped area.

Well MO-7 was installed to monitor the water-level fluctuations and water quality of any ground water in the "pre-law" refuse under the cap for comparison with water quality in the "post-law" refuse from well MO-8, located next to MO-7.

Well MO-9 was installed to monitor the quality and water-level fluctuations of water in the "post-law" refuse, downgradient from wells MO-7 and MO-8. This well was located so as to collect any water in the "post-law" refuse for comparison with water quality in wells MO-5 and MO-6.

On August 26, 1983, monitor wells MO-5, MO-7, MO-8, and MO-9 were instrumented with Stevens Type-F continuous water-level recorders. The water-level recorder on MO-4 was removed and placed on well MO-5. All of these wells were dry.

A monitoring run was completed on September 14, 1983. Although significant precipitation occurred between August 26 and September 14 (e.g., September 3, 1.75 inches), wells MO-4, MO-6, MO-7, MO-8, and MO-9 were dry on September 14 and charts on water-level recorders showed that no water inflow to the wells occurred. Well MO-5 had approximately 0.5 foot of water.

During the November 4, 1983, and January 5, 1984, monitoring runs, wells MO-7, MO-8, and MO-9 were dry. Water-level charts from MO-3 for the January run showed that ground water in the well had

risen above the well casing sometime between November 4 and January 5.

Figure 7 shows a hydrograph of daily water-level highs for well MO-3 and daily precipitation monitored on-site. The record indicates rapid recharge and discharge to the ground-water system in response to rainfall or lack of.

Ground-water samples were collected from well MO-3 on August 26, September 14, and November 4, 1983, and January 5, 1984. Samples were collected from well MO-5 on November 4, 1983, and January 5, 1984. The November monitoring run was the first run performed on a bimonthly basis in accordance with the schedule approved by the Surface Mining Commission. Bimonthly monitoring was initiated after the vegetative cover on the "post-law" material was established. All samples collected were preserved and laboratory analyses completed according to standard procedures. Results of analyses are given in table 1 along with previous analyses. Figures 8 and 9 are graphs illustrating the relationship of certain water quality parameters of the samples collected throughout the monitoring period to date. The contrast between the chemical characteristics of water sampled from "pre-law" drainage and ground water and the chemical characteristics of water sampled from "post-law" drainage are very distinct. The figures show that the relationships of sulfate concentrations and the indicators of mineral constituents in the water (total dissolved solids and specific conductance) are significantly greater in the "pre-law" surface water and ground water. The specific conductance cannot be directly correlated to total dissolved solids for highly acidic water samples but can be used as a basis of comparison.

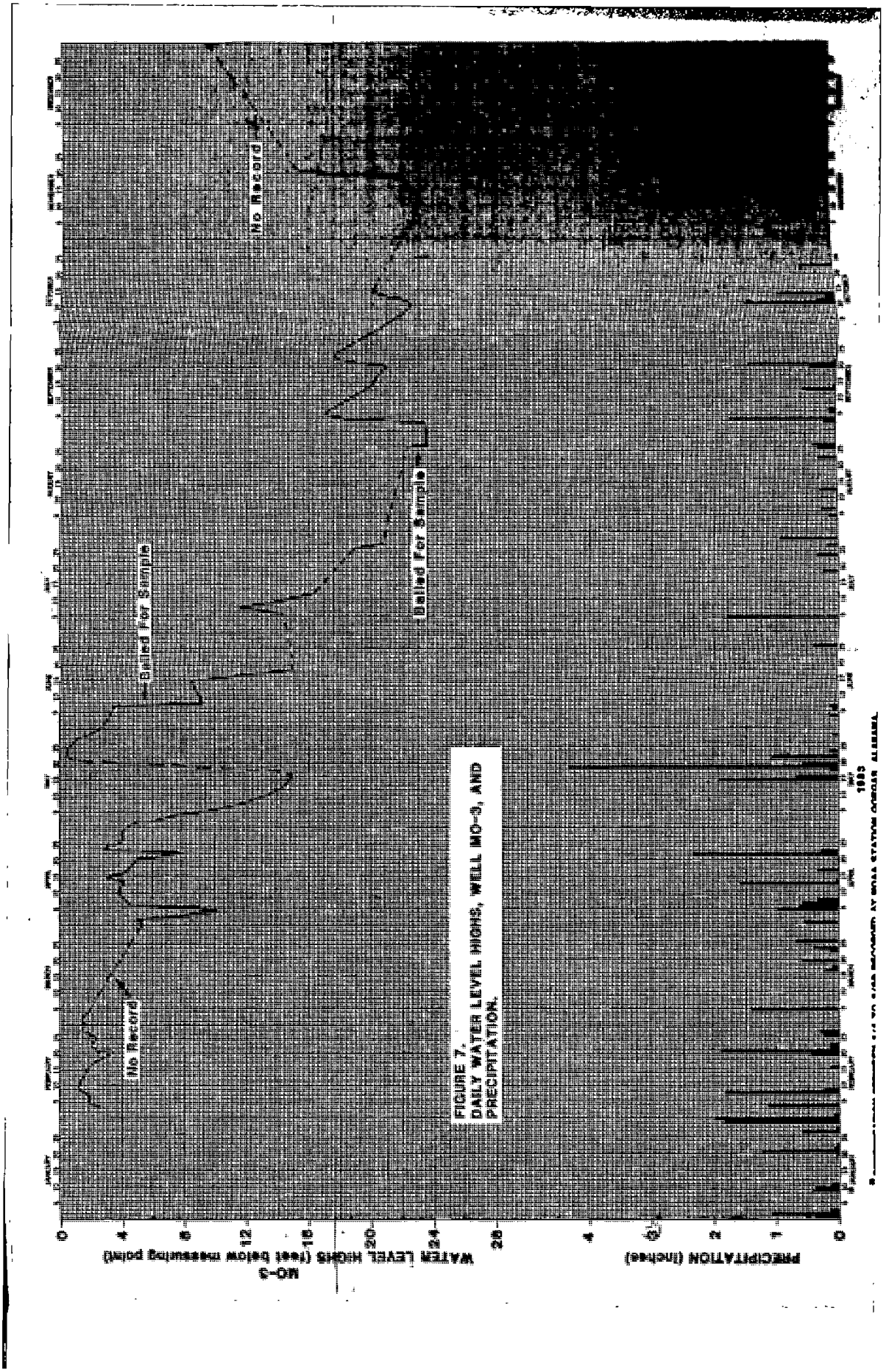


FIGURE 7.
DAILY WATER LEVEL HIGHS, WELL MO-3, AND PRECIPITATION.

DRUM000163

PELA

Table 1. Monitoring data.

SAMPLE SITE	MO-3	MO-4	SW-1	SW-2	SW-3
DATE COLLECTED: February 4, 1983					
Field analysis:					
pH	2.9	-		4.4	2.9
Specific conductance (micromhos)	490	-		172	1,000
Water level (feet below measuring point)	2.58	Dry		1/	1/
Discharge (cfs)	1/	1/		0.25	0.05
Laboratory analysis:					
Total iron (mg/l)	533	-		1.90	501.00
Total manganese (mg/l)	50.50	-		0.11	94
Total dissolved solids (mg/l)	11,252	-		52	30,258
Total suspended solids (mg/l)	432	-		30	133
Sulfate (mg/l)	7,350	-		25	20,025
DATE COLLECTED: March 2, 1983					
Field analysis:					
Temperature (°C)	20	-	27.5	15	24
pH	3.25	-	2.69	4.23	2.64
Specific conductance (micromhos)	7,500	-	7,400	205	14,000
Water level (feet below measuring point)	1.43	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	0.13	0.34	0.05
Laboratory analysis:					
Total iron (mg/l)	800	-	570	0.18	2,200
Total manganese (mg/l)	58	-	56.8	0.09	87.6
Total dissolved solids (mg/l)	12,716	-	12,092	57	32,812
Total suspended solids (mg/l)	156	-	4	16	1
Sulfate (mg/l)	8,600	-	8,750	33	20,400

Table 1. Monitoring data. (continued)

SAMPLE SITE	MO-3	MO-4	SW-1	SW-2	SW-3
DATE COLLECTED: March 31, 1983					
Field analysis:					
Temperature (°C)	16	-	-	14	15
pH	2.33	-	-	5.30	2.72
Specific conductance (micromhos)	14,800	-	-	30	15,200
Water level (feet below measuring point)	6.03	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	Dry	0.209	0.11
Laboratory analysis:					
Total iron (mg/l)	2,657	-	-	0.13	3,051
Total manganese (mg/l)	118	-	-	0.01	128
Total dissolved solids (mg/l)	36,437	-	-	26	40,088
Total suspended solids (mg/l)	417	-	-	10	0.0
Sulfate (mg/l)	24,700	-	-	17	24,250
DATE COLLECTED: April 29, 1983					
Field analysis:					
Temperature (°C)	20	-	-	22	25
pH	2.75	-	-	4.08	2.68
Specific conductance (micromhos)					
Water level (feet below measuring point)	4.20	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	Dry	0.02	0.01
Laboratory analysis:					
Total iron (mg/l)	1,556	-	-	0.25	2,815
Total manganese (mg/l)	98.4	-	-	0.12	107
Total dissolved solids (mg/l)	27,674	-	-	41	37,401
Total suspended solids (mg/l)	106	-	-	14	1
Sulfate (mg/l)	20,500	-	-	17	27,500

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Table 1. Monitoring data. (continued)

SAMPLE SITE	MO-3	MO-4	SW-1	SW-2	SW-3
DATE COLLECTED: June 7, 1983					
Field analysis:					
Temperature (°C)	22	-	-	-	23
pH	2.93	-	-	-	2.82
Specific conductance (micromhos)	15,500	-	-	-	17,500
Water level (feet below measuring point)	3.28	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	Dry	Dry	0.01
Laboratory analysis:					
Total iron (mg/l)	2,080	-	-	-	2,975
Total manganese (mg/l)	73.25	-	-	-	83.85
Total dissolved solids (mg/l)	35,441	-	-	-	39,665
Total suspended solids (mg/l)	370	-	-	-	70
Sulfate (mg/l)	26,400	-	-	-	25,600
DATE COLLECTED: July 12, 1983					
Field analysis:					
Temperature (°C)	24	-	-	-	31
pH	3.04	-	-	-	2.60
Specific conductance (micromhos)	10,000	-	-	-	21,500
Water level (feet below measuring point)	20.46	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	Dry	Dry	0.001
Laboratory analysis:					
Total iron (mg/l)	910	-	-	-	2,012
Total manganese (mg/l)	35.94	-	-	-	181.53
Total dissolved solids (mg/l)	13,867	-	-	-	41,481
Total suspended solids (mg/l)	60	-	-	-	17
Sulfate (mg/l)	9,500	-	-	-	27,400

Table 1. Monitoring data. (continued)

SAMPLE SITE	MO-3	MO-5	MO-7	MO-8	MO-9	SW-1	SW-2	SW-3
DATE COLLECTED: August 26, 1983								
Field analysis:								
pH	2.53	-	-	-	-	-	-	-
Specific conductance (micromhos)	7,500	-	-	-	-	-	-	-
Water level (feet below measuring point)	24.2	Dry	Dry	Dry	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	1/	1/	1/	Dry	Dry	Dry
Laboratory analysis:								
Total iron (mg/l)	433	-	-	-	-	-	-	-
Total manganese (mg/l)	47	-	-	-	-	-	-	-
Total dissolved solids (mg/l)	10,522	-	-	-	-	-	-	-
Total suspended solids (mg/l)	37	-	-	-	-	-	-	-
Sulfate (mg/l)	7,300	-	-	-	-	-	-	-
DATE COLLECTED: September 14, 1983								
Field analysis:								
pH	3.30	-	-	-	-	-	-	-
Specific conductance (micromhos)	10,000	-	-	-	-	-	-	-
Water level (feet below measuring point)	19.79	*	Dry	Dry	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	1/	1/	1/	Dry	Dry	Dry
Laboratory analysis:								
Total iron (mg/l)	1,476	-	-	-	-	-	-	-
Total manganese (mg/l)	48.29	-	-	-	-	-	-	-
Total dissolved solids (mg/l)	17,029	-	-	-	-	-	-	-
Total suspended solids (mg/l)	158	-	-	-	-	-	-	-
Sulfate (mg/l)	11,500	-	-	-	-	-	-	-

Table 1. Monitoring data. (continued)

SAMPLE SITE	MO-3	MO-5	MO-7	MO-8	MO-9	SW-1	SW-2	SW-3
DATE COLLECTED: November 4, 1983								
Field analysis:								
pH	4.25	4.15	-	-	-	-	-	-
Specific conductance (micromhos)	9,600	8,200	-	-	-	-	-	-
Water level (feet below measuring point)	22.36	77.59	Dry	Dry	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	1/	1/	1/	Dry	Dry	Dry
Laboratory analysis:								
Total iron (mg/l)	955.5	1,000	-	-	-	-	-	-
Total manganese (mg/l)	55.75	102.5	-	-	-	-	-	-
Total dissolved solids (mg/l)	19,836	19,284	-	-	-	-	-	-
Total suspended solids (mg/l)	1,153	16,280	-	-	-	-	-	-
Sulfate (mg/l)	17,000	14,000	-	-	-	-	-	-
DATE COLLECTED: January 5, 1984								
Field analysis:								
pH	3.2	2.3	-	-	-	-	5.55	3.35
Specific conductance (micromhos)	4,300	10,000	-	-	-	-	122	13,000
Water level (feet below measuring point)	8.54	69.98	Dry	Dry	Dry	1/	1/	1/
Discharge (cfs)	1/	1/	1/	1/	1/	Dry	<5	<5
Laboratory analysis:								
Total iron (mg/l)	361	844	-	-	-	-	**0.02	2,275
Total manganese (mg/l)	19.5	27.39	-	-	-	-	0.05	45.96
Total dissolved solids (mg/l)	6,342	15,636	-	-	-	-	170	31,444
Total suspended solids (mg/l)	1,535	5,135	-	-	-	-	14	1.5
Sulfate (mg/l)	4,500	10,400	-	-	-	-	22.5	20,700

1/ Does not apply. * Approximately 0.5 foot of water in well. ** Below detection limit.

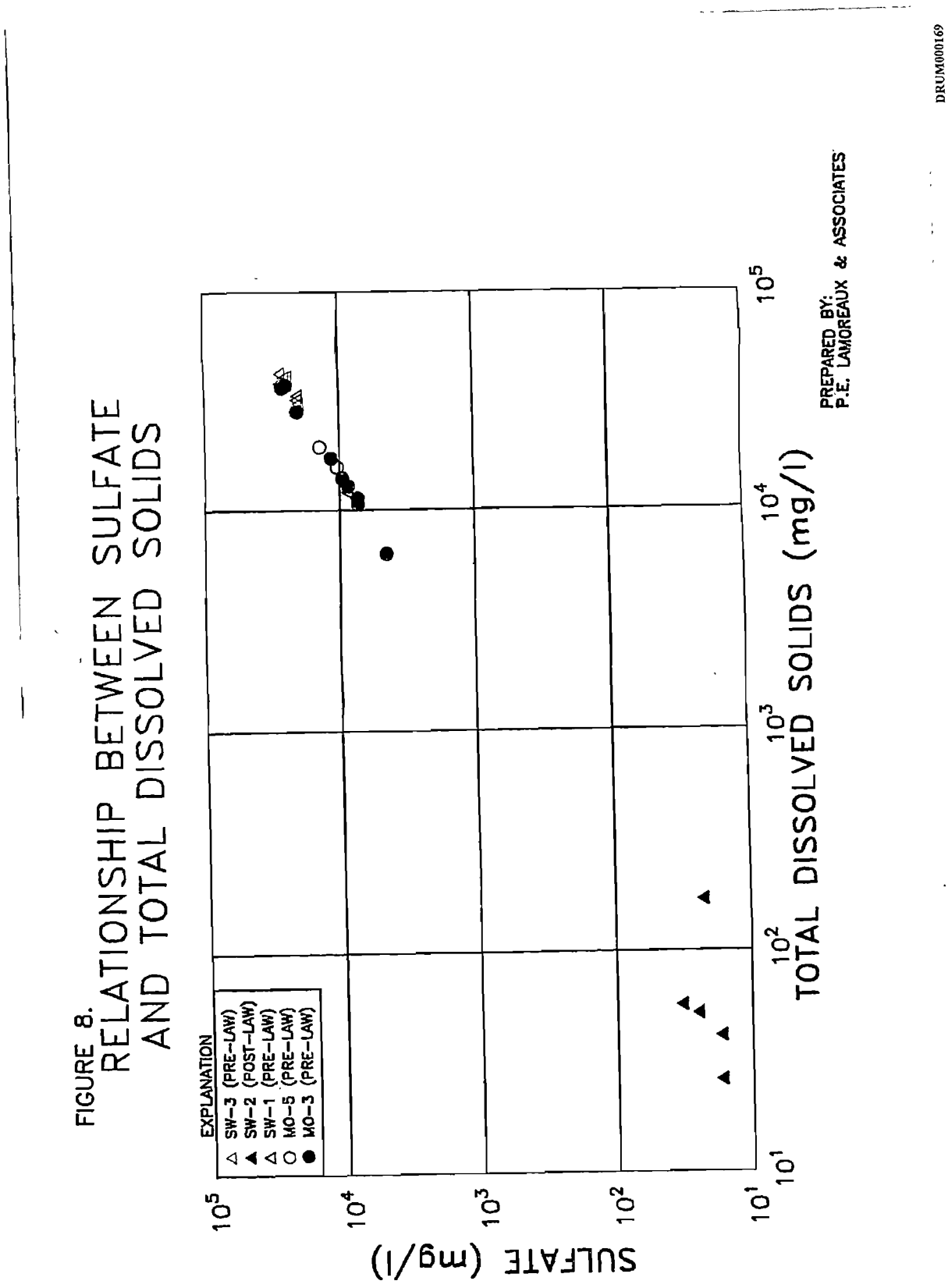
FIGURE 8.
RELATIONSHIP BETWEEN SULFATE
AND TOTAL DISSOLVED SOLIDS
EXPLANATION
SW-3 (PRE-LAW)
SW-2 (POST-LAW)
SW-1 (PRE-LAW)
MO-5 (PRE-LAW)
MO-3 (PRE-LAW)
SULFATE (mg/l)
TOTAL DISSOLVED SOLIDS (mg/l)
10^1
10^2
10^3
10^4
10^5
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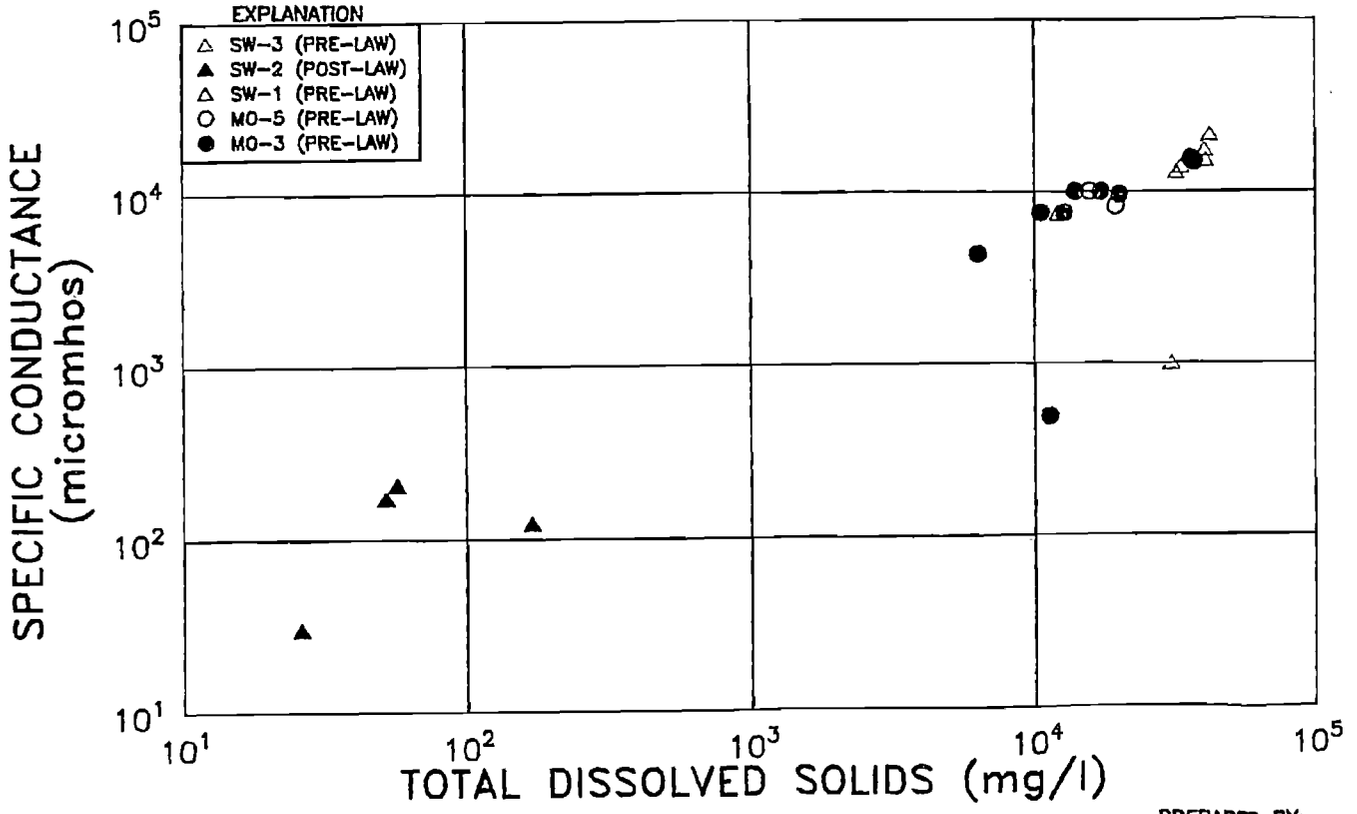
FIGURE 9.

RELATIONSHIP BETWEEN SPECIFIC CONDUCTANCE AND TOTAL DISSOLVED SOLIDS



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The ratio between the parameters plotted appears to remain constant indicating the source of water for "pre-law" and "post-law" areas is the same. However, the "pre-law" water is at a greater concentration due to leaching.

There was no flow at surface-water sites SW-1 (discharge from the upper pond), SW-2 (west ditch), and SW-3 (east ditch) during the August, September, and November monitoring runs.

The diversion ditch systems planned for segregating the capped area drainage from the old area drainage were completed August 26, 1983. During each monitoring run, the drainage ditch systems were checked for evidence of breaching and excessive erosion. No such evidence has occurred to date. The cross-over (fig. 1) of the parallel ditches has been effective in segregating the runoff/discharge from the pre-law and post-law areas.

In addition, rainfall pH is being measured on site by ABC personnel and provided to PELA for use in the hydrologic assessment. The acidity of rainfall as indicated by rainwater pH is given in table 2.

Table 2. Rainfall pH.

SAMPLE SITE	Near Office	Reclamation Area
DATE OF SAMPLING		
1/20/84	4.7	5.8
1/26/84	4.7	4.9

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APPENDIX I

Logs and Construction Diagrams for Wells MO-3 and MO-4

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MAXINE ROCK DISPOSAL AREA

Well No. MO-3

Drilled: 1/18/83

Blow Counts	Interval Sampled (feet)	Description
3-3	0 - 1.0	Refuse material; dark-greenish-gray (5GY 4/1) to greenish-black (5G 2/1), semi-consolidated, weathered, poorly sorted, sandy clay, shale fragments, coal fragments, large (15 mm) sandstone fragments, "red rock" fragments, mica, pyrite, iron staining.
2-6-9	4.5 - 6.0	Refuse material; light-olive-brown (5Y 5/6) to olive-gray (5Y 4/1), consolidated, weathered, predominantly sandy clay, shale fragments, coal fragments, "red rock" fragments, mica, iron staining, roots, damp.
3-3-3	9.5 - 11.0	Refuse material; olive-gray (5Y 3/2), sandy clay, unconsolidated, poorly sorted, large (15 mm) shale and sandstone fragments, iron staining, "red rock" fragments, coal fragments.
	Water at 10.0 feet.	
3-2-2	14.5 - 16.0	Refuse material; olive-gray (5Y 4/11) to olive-black (5Y 2/1), consolidated, predominantly sandy clay, large "red rock" fragments (10 to 30 mm), coal and shale fragments, layered, iron staining, sulfur crystals, wet.
4-4-4	19.5 - 21.0	Refuse material; greenish-black (5G 2/1) to dark-gray (N3), small (1.0 to 2.0 mm) unconsolidated fragments of shale, coal, "red rock" and sandstone; at 20 feet becomes clayey with shale fragments (10 mm), stem fragments, and "red rock", shale, mica, iron staining, wet.
	Drilling harder at 21.0 feet.	

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Well No. MO-3
(continued)

Blow Counts	Interval Sampled (feet)	Description
5-4-5	22.0 - 23.5	Refuse material; olive-black (5Y 2/1), sandy clay layer with small (0.5 to 1.0 mm) fragments of shale, "red rock" and sandstone, iron staining, some mica. Very little clay at 23.0 to 23.5 feet, unconsolidated, poorly sorted fragments (2 to 3 mm) of shale and "red rock", some coal fragments, mica, iron staining, wet.
6-4-5	24.5 - 26.0	Refuse material; grayish-black (N2) to olive-black (5Y 2/1), clay, sandy to 25.0 feet with small fragments (1.0 to 2.0 mm) of shale and "red rock", mica. From 25.0 to 26.0 feet - organics, clay - increasing in sand, scattered large fragments (4 to 10 mm) of shale and "red rock", mica, wet.
46-33-50	27.0 - 28.5	Refuse material to 27.5 feet; grayish-black (N2) to olive-black (5Y 2/1), sandy clay, small fragments (1 to 2 mm) of shale, larger (2 to 5 mm) fragments of "red rock", very micaceous, wet. 27.5 to 28.5 - weathered bedrock; clayey sand, moderate-yellow (5Y 7/6) to moderate-olive-brown (5Y 4/4), mottled, fine- to medium-grained, very micaceous, iron staining.

Drilling completed.

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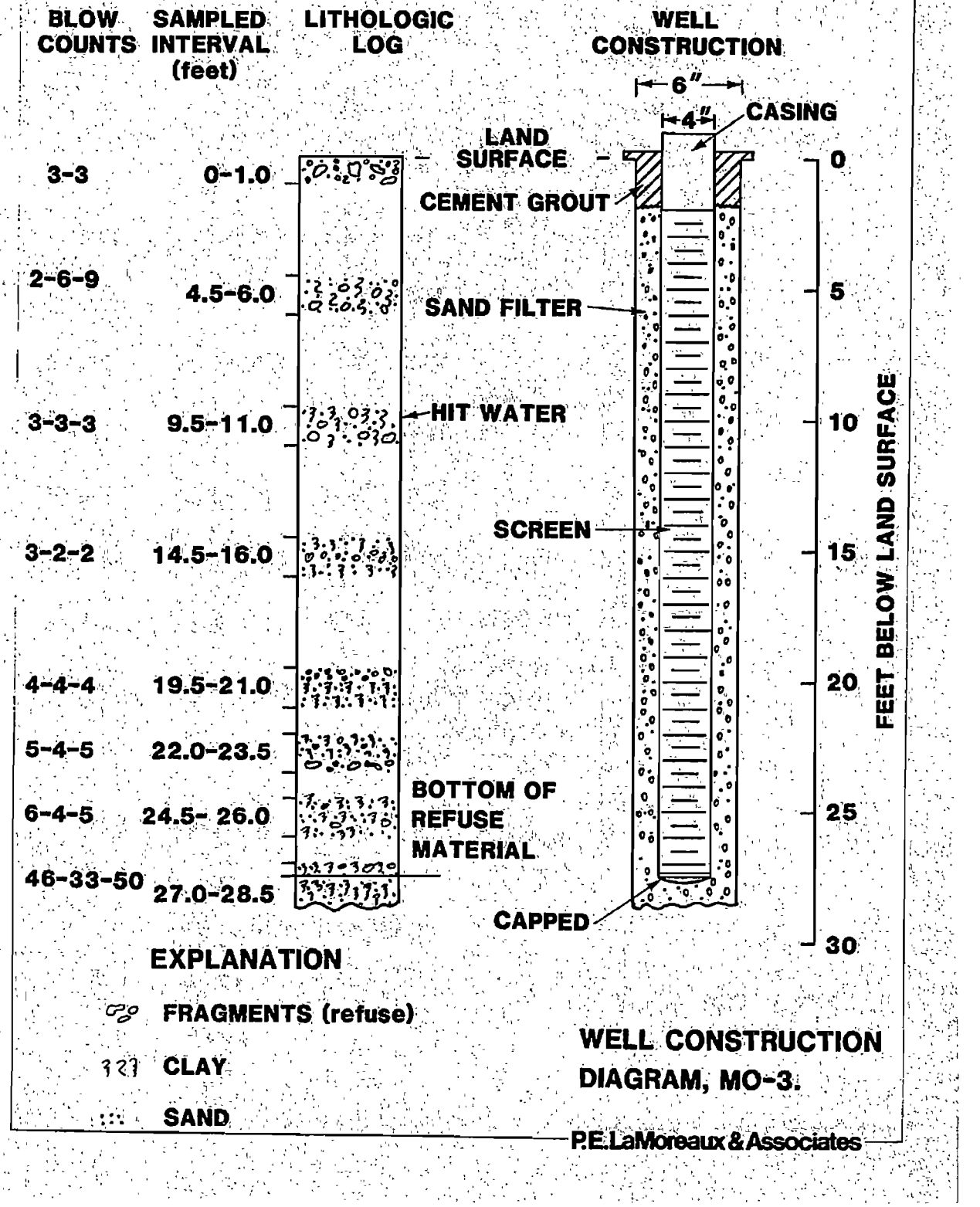
MAXINE ROCK DISPOSAL AREA

WELL NO. MO-3



WELL CONSTRUCTION DIAGRAM, MO-3.

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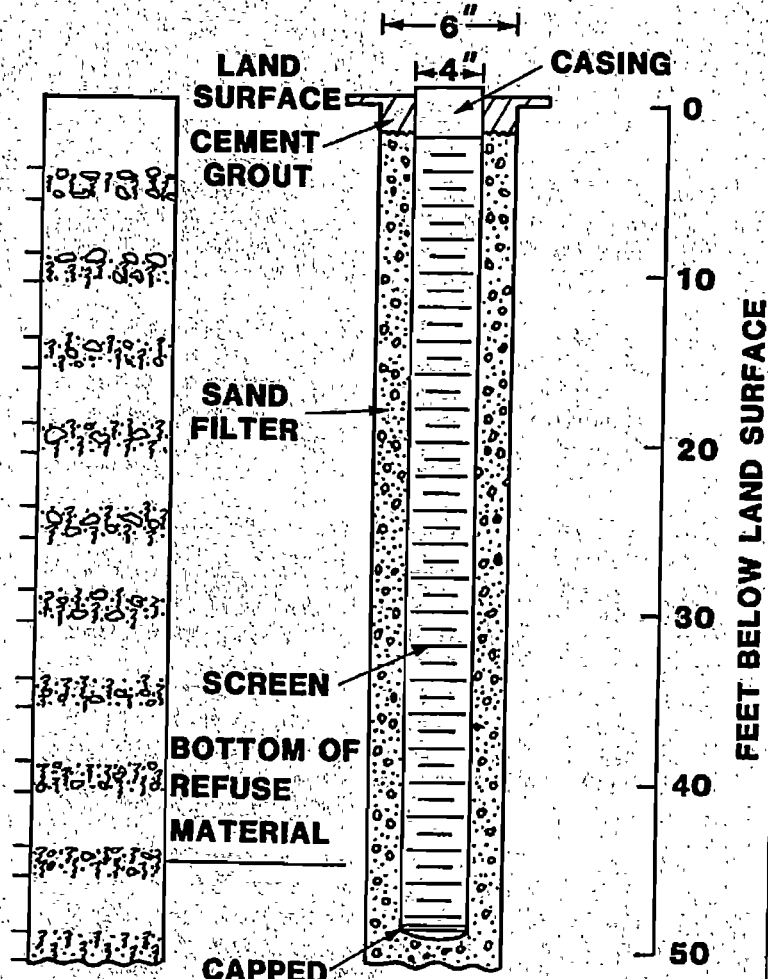
MAXINE ROCK DISPOSAL AREA
WELL NO. MO-4

BLOW COUNTS	SAMPLED INTERVAL (feet)
4-3-3	4.5-6.0
5-3-6	9.5-11.0
6-5-3	14.5-16.0
4-4-2	19.5-21.0
3-2-3	24.5-26.0
3-3-3	29.5-31.0
4-4-4	34.5-36.0
5-4-4	39.5-41.0
3-4-6	44.5-46.0
4-5-17	49.5-51.0



EXPLANATION

FRAGMENTS (refuse)

CLAY

SAND

WELL CONSTRUCTION DIAGRAM, MO-4.

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A-1, 3

MAXINE ROCK DISPOSAL AREA

Well No. MO-4

Drilled: 1/18/83

Blow Counts	Interval Sampled (feet)	Description
4-3-3	4.5 - 6.0	Refuse material; grayish-black (N2) to greenish-black (5G 2/1), weathered, unconsolidated, scattered clay layers, shale and coal fragments (1 to 10 mm), mica.
5-3-6	9.5 - 11.0	Refuse material; greenish-black (5G 2/1) to black (N1), mostly unconsolidated, weathered, scattered clay layers, sandy clay, coarse-grained, scattered coal fragments (10 to 20 mm), mica, shale fragments, iron staining.
6-5-3	14.5 - 16.0	Refuse material; greenish-black (5G 2/1) to black (N1), sandy clay, medium-grained, shale fragments (15 mm), scattered clay fragments (20 mm), coal fragments (1 to 5 mm), very micaceous, iron staining.
4-4-2	19.5 - 21.0	Refuse material; grayish-black (N2) to black (N1), clayey sand, medium- to fine-grained, semi-consolidated, large fragments (10 to 20 mm) of shale, scattered sandstone fragments (2 mm), very micaceous.
3-2-3	24.5 - 26.0	Refuse material; black (N1), sandy clay, medium- to fine-grained, semi-consolidated, large fragments of shale and shaly sandstone (10 to 20 mm), very-dark-red (5R 2/6) iron staining, very micaceous.
3-3-3	29.5 - 31.0	Refuse material; grayish-black (N2) to black (N1), sandy clay, medium- to fine-grained, semi-consolidated, large fragments of shale, sandy shale and clay (10 to 20 mm) with plant fossils, scattered coal fragments (2 mm), very micaceous, very-dark-red (5R 2/6) to grayish-orange (10YR 7/4), iron staining.

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Well No. MO-4
(continued)

Blow Counts	Interval Sampled (feet)	Description
4-4-4	34.5 - 36.0	Refuse material; grayish-black (N2) to black (N1), sandy clay, fine-grained, shale fragments (2 to 10 mm), coal fragments (2 mm), scattered clay layers, predominantly dark-yellowish-orange (10YR 6/6) iron staining with some very-dark-red (5R 2/6) iron staining, very micaceous.
5-4-4	39.5 - 41.0	Refuse material; as above, slightly more clay.
3-4-6	44.5 - 46.0	Refuse material to 45.0 feet; grayish-black (N2) to black (N1), sandy clay, consolidated, scattered shale fragments (10 mm), dark-yellowish-orange (10YR 6/6) iron staining, very micaceous. 45.0 to 46.0 - clay; moderate-brown (5YR 4/4) to light-brown (5YR 5/6), mottled, sandy, some shale fragments, root and stem pieces, some mica.
4-5-17	49.5 - 51.0	Clay; light-brown (5YR 5/6) to moderate-reddish-brown (10R 4/6), mottled, sandy, some shale fragments, root and stem pieces, some mica.

Drilling completed.

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APPENDIX II

Lithologic Logs for Wells MO-5 through MO-9

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MAXINE ROCK DISPOSAL AREA

Well No. MO-5

Drilled: 7/26/83 - 7/27/83

Blow Counts	Interval Sampled (feet)	Description
Augered:	0 - 40.0	Refuse material, brownish-black (5 YR 2/1) to dark-gray (N3), sandy clay, fine- grained, "red rock" fragments, shale fragments, coal fragments. Refuse material more sandy at 15.0 feet with large sandstone and sandy shale (12 to 25 mm) fragments. At 20.0 feet - refuse material, blackish-red (5R 2/2), clayey sand with sandstone fragments (8 to 12 mm), "red rock" fragments (10 to 20 mm) at 30.0 feet.
Sampled at 40.0 feet.		
5-6-6	40.0 - 41.5	Refuse material, blackish-red (5R 2/2) clayey sand, fine-grained, large coal fragments (38 mm), shale and sandstone fragments, dusky-red (5R 3/4) stain on sandstone and shale fragments.
6-10-13	50.0 - 51.5	Refuse material, blackish-red (5R 2/2) clayey sand, fine-grained, large coal and shale fragments (38 mm), dusky-red (5R 3/4) stain, clay layers, medium-light-gray (N6).
6-9-12	60.0 - 61.5	Refuse material, dark-gray (N3) to grayish-black (N2), clayey sand, fine-grained, coal and shale fragments.
- - 10	65.0 - 66.5	Refuse material, dark-gray (N3) to grayish-black (N2), clayey sand, fine-grained, coal and shale fragments, pyrite.
- - 10	70.0 - 71.5	Refuse material, dark-gray (N3) to grayish-black (N2), clayey sand, fine-grained, small coal and shale fragments (2 to 3 mm), sulfur crystals.

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MAXINE ROCK DISPOSAL AREA

Well No. MO-5
(continued)

Drilled: 7/26/83 - 7/27/83

Blow Counts	Interval Sampled (feet)	Description
	75.0 - 76.5	Refuse material to 76.0 feet. At 76.0 feet clay, dark-yellowish-orange (10YR 6/6) and light-brown (5YR 5/6), mottled, silty.
	76.5 - 80.0	Clay, dark-yellowish-brown (10YR 6/6) sandy, wet.

Drilling completed.

PELA

A-II, 3

MAXINE ROCK DISPOSAL AREA

Well No. MO-6

Drilled: 7/27/83

Blow Counts	Interval Sampled (feet)	Description
Augered:	0 - 60.0	Refuse material as in MO-5. At 47.0 feet - hard drilling, large sandstone fragments (25 to 38 mm), dark-gray (N3).
Sampled at 60.0 feet.		
8-9-11	60.0 - 61.5	Refuse material, dark-gray (N3), clayey sand, fine-grained, hard clay fragments (2 to 4 mm), light-gray (N7), coal fragments (2 mm), dusky-red (5R 3/4) stain.
8-14-16	65.0 - 66.5	Refuse material, dark-gray (N3), sandy clay, very-fine-grained, coal and shale fragments (2 to 4 mm), light-brown (5YR 5/6) stain.
8-9-5	70.0 - 71.5	Refuse material, dark-gray (N3), sandy clay, very-fine-grained, shale fragments (13 mm), increased light-brown (5YR 5/6) stain.
	75.0 - 76.5	Clay, light-brown (5YR 5/6), dark-yellowish-orange (10YR 6/6), mottled, at 76.0 feet moderate-brown (5YR 4/4), very-fine-grained, sandy.
Drilling completed.		

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MAXINE ROCK DISPOSAL AREA

Well No. MO-7

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
- 11 -	0 - 1.5	Clay cap, light-brown (5YR 5/6), grayish-brown (5YR 3/2), moderate-reddish-brown (10R 4/6), mottled, sandy, fine-grained, micaceous.
18-27-37	1.5 - 3.0	Clay cap to 2 feet. At 2 feet refuse material, grayish-black (N2), clayey sand, fine-grained, clay layers, medium-dark-gray (N4), weathered pale-reddish-brown stain.
33-32-30	3.0 - 4.5	Refuse material, dark-gray (N3), sandy clay, very-fine-grained, clay layers, medium-light-gray (N4) to medium-gray (N5), hard, coal and shale fragments (2 to 3 mm).
13-27-30	4.5 - 6.0	Refuse material, medium-dark-gray (N4), sandy clay, very fine-grained, large sandstone fragments (19 mm), micaceous, shale and coal fragments (1 to 2 mm), dark-yellowish-orange stain (10YR 6/6).
9-8-7	6.0 - 7.5	Refuse material, grayish-black (N2) to black (N1), clayey sand, very-fine-grained, coal fragments (1 to 2 mm), sandstone fragments (12 mm).
4-4-3	7.5 - 9.0	Refuse material, grayish-black (N2) to black (N1), clayey sand, very-fine-grained, coal and shale fragments (1 mm), shaly sandstone fragments (12 mm).
2-3-5	9.0 - 10.5	Refuse material, grayish-black (N2) to black (N1), clayey sand, very-fine-grained, sandstone fragments (6 mm), large coal fragments (19 mm).

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MAXINE ROCK DISPOSAL AREA

Well No. MO-7
(continued)

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
12-17-13	10.5 - 12.0	Refuse material, dark-gray (N3), clayey sand, very-fine-grained, layer of large sandstone fragments (19 to 26 mm) at 10.5 to 10.8.
10-8-4	12.0 - 13.5	Refuse material, dark-gray (N3), sandy clay, very-fine-grained, shale and coal fragments (0.5 to 1 mm), layer of large sandstone fragments (19 to 26 mm) at 12.0 to 13.0 feet, medium-gray (N5), very micaceous.
5-4-18	13.5 - 15.0	Refuse material, grayish-black (N2) to black (N1), sandy clay, very-fine-grained, shale fragments (0.5 to 1 mm). At 14.5 to 15.0 feet large sandstone fragments (25 mm), medium-light-gray (N6), hard, micaceous.
12-15-11	15.0 - 16.5	Refuse material, grayish-black (N2) to black (N1), sandy clay, coal and shale fragments (0.5 to 1 mm), sandy shale and sandstone fragments (6 to 12 mm), medium-dark-gray (N4).
16-13-21	16.5 - 18.0	Refuse material, medium-dark-gray (N4) to medium-gray (N5), sandy clay, more clay than above, fine- to medium-grained, coal and shale fragments (2 to 6 mm), dark-yellowish-orange (10YR 6/6) stain.
11-8-8	18.0 - 19.5	Refuse material, medium-gray (N5), sandy clay as above, shale and coal fragments (2 to 6 mm), "red rock" fragments (3 mm), sulfur crystals, very sandy clay lenses, grayish-black (N2).

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MAXINE ROCK DISPOSAL AREA

Well No. MO-7
(continued)

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
4-3-3	19.5 - 21.0	Refuse material, dark-gray (N3) to medium--dark-gray (N4), sandy clay, fine-grained, coal, shale, and sandstone fragments (3 mm), shale and sandy shale fragments (22 mm), sulfur crystals, clay layers, medium-dark-gray (N4).
3-3-6	21.0 - 22.5	Refuse material, dark-gray (N3), sandy clay, fine-grained, coal and shale fragments, sulfur stains. At 22.3 feet large sandstone fragments (24 to 28 mm), medium-gray (N5), fine- to medium-grained.
10-20-15	22.5 - 24.0	Refuse material as above with large sandstone fragments (24 to 28 mm), medium-gray (N5), fine- to medium-grained.
11-8-7	24.0 - 25.5	Refuse material, medium-dark-gray (N4), sandy clay, very-fine- to fine-grained, coal and shale fragments (2 mm), dark-yellowish-orange (10YR 6/6) to moderate-reddish-brown (10R 4/6) stains.
3-2-4	25.5 - 27.0	Refuse material, medium-dark-gray (N4), sandy clay, very-fine- to fine-grained, shale and coal fragments (2 to 6 mm), shale, sandy shale and sandstone fragments (18 mm), staining as above, slightly moist.
- - 2	27.0 - 28.5	Refuse material as above, no large sandstone fragments, dry.
-15-17	28.5 - 30.0	Refuse material, medium-gray (N5) to light-gray (N7), clay, slightly sandy, shale fragments (18 mm), fossiliferous, sandstone fragments (15 mm), medium-gray (N5), coal fragments (3 mm).

PELA

MAXINE ROCK DISPOSAL AREA

Well No. MO-7
(continued)

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
8-7-10	30.0 - 31.5	Refuse material, dark-gray (N3), clayey sand, coal, shale, and sandstone fragments (1 to 2 mm), sandy shale and sandstone fragments (12 mm).
6-4-5	31.5 - 33.0	Refuse material as above.
1-9-12	33.0 - 34.5	Refuse material, dark-gray (N3), clayey sand, coal, shale, and sandstone fragments (1 to 2 mm), more sandstone fragments (12 mm) than above.
10-11-7	34.5 - 36.0	Refuse material, dark-gray (N3), clayey sand, coal, and shale fragments (1 to 2 mm), large fragments of sandstone (12 mm).
1-6-7	36.0 - 37.5	Refuse material as above.
1-7-12	37.5 - 39.0	Refuse material as above, moderate-yellowish-brown (10YR 5/4) stain, very slightly moist.
6-17-17	39.0 - 40.5	Refuse material, dark-gray (N3), clayey sand, coal, sandstone, and shale fragments (1 to 2 mm), large sandy shale fragments (12 mm), moderate-yellowish-brown (10YR 5/4) stain.
8-7-6	40.5 - 42.0	Refuse material, dark-gray (N3), clayey sand, fine-grained, shale and coal fragments (1 to 2 mm), sandstone fragments (25 mm), medium-light-gray (N6).
4-6-7	42.0 - 43.5	Refuse material as above, pale-brown (5YR 5/2) mottling.
4-18-17	43.5 - 45.0	Refuse material, dark-gray (N3), clayey sand, fine-grained, shale and coal fragments (1 to 2 mm), sandstone fragments (25 mm), medium-light-gray (N6).

PELA

MAXINE ROCK DISPOSAL AREA

Well No. MO-7
(continued)

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
10-6-4	45.0 - 46.5	Refuse material as above, dusky-red (5R 3/4) stain on large sandstone and sandy shale fragments, sulfur crystals.
-6-6	46.5 - 48.0	Refuse material as above, very moist at 47.0 feet.
-5-10	48.0 - 49.5	Refuse material, dark-gray (N3), sandy clay, fine-grained, coal and shale fragments (1 to 2 mm), shaly sandstone fragments (12 mm), dark-yellowish-orange (10YR 6/6) and dark-reddish-brown (10R 3/4) stains.
1-8-7	49.5 - 51.0	Refuse material, as above, layer of "red rock" at 50.0 to 50.2 feet.
8-10-6	51.0 - 52.5	Refuse material, dark-gray (N3), moderate-red (5R 4/6), dark-yellowish-orange (10YR 6/6), mottled, sandy clay, fine-grained, coal and shale fragments (1 to 2 mm).
6-10-11	52.5 - 54.0	Refuse material as above.
- - 18	54.0 - 55.5	Refuse material as above.
8-10-12	55.5 - 57.0	Refuse material, dark-gray (N3), moderate-red (5R 4/6), dark-yellowish-orange (10YR 6/6), mottled, sandy clay, fine-grained, coal and shale fragments (1 to 2 mm), clay lenses, medium-gray (N5), pyrite crystals.
10-17-17	57.0 - 58.5	Refuse material as above.
10-14-15	58.5 - 60.0	Refuse material as above.

PELA

MAXINE ROCK DISPOSAL AREA

Well No. MO-7
(continued)

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
	60.0 - 61.5	Refuse material, dark-gray (N3), moderate-red (5R 4/6), dark-yellowish-orange (10YR 6/6), mottled, sandy clay, fine-grained, coal and shale fragments (1 to 2 mm), clay lenses, medium-gray (N5), pyrite crystals, "red rock" at 61.0 to 61.5 feet.
2-5-2	61.5 - 63.0	Refuse material to 62.5 feet, "red rock". At 62.5 feet clay, very-pale-orange (10YR 8/2), moderate-reddish-brown (10R 4/6), moderate-brown (5YR 3/4), mottled, sandy, coal fragments (2 mm).
	63.0 - 64.5	Clay, moderate-brown (5YR 3/4), silty, stems, leaves.

Drilling completed.

PELA

A-II, 10

MAXINE ROCK DISPOSAL AREA

Well No. MO-8

Drilled: 7/28/83

Blow Counts	Interval Sampled (feet)	Description
Augered:	0 - 10.5	0 to 2.0 feet - clay cap, light-brown (5YR 5/6), grayish-brown (5YR 3/2), moderate-reddish-brown (10R 4/6), mottled, sandy, fine-grained, micaceous. 2.0 to 10.5 feet - refuse material as in MO-7.
Sampled at 10.5 feet.		
19-25-30	10.5 - 12.0	Refuse material, dark-gray (N3), sandy clay, coal and shale fragments (1 to 2 mm), sandstone fragments (24 mm), fine-grained.
7-9-8	12.0 - 13.5	Refuse material, as above, sandstone fragments (18 mm).
3-4-5	13.5 - 15.0	Refuse material, dark-gray (N3), sandy clay, coal and shale fragments (1 to 2 mm), sandstone fragments (24 mm).
2-10-17	15.0 - 16.5	Refuse material, dark-gray (N3), sandy clay, more clay than above, coal and shale fragments (6 mm).
Drilling completed.		

PELA

A-II, 11

MAXINE ROCK DISPOSAL AREA

Well No. MO-9

Drilled: 7/29/83

Blow Counts	Interval Sampled (feet)	Description
Augered:	0 - 10.0	0 to 3.5 feet - clay cap, light-brown (5YR 5/6), grayish-brown (5YR 3/2), moderate-reddish-brown (10R 4/6), mottled, sandy, fine-grained, micaceous. 3.5 to 10.0 feet - refuse material, grayish-black (N2), sandy clay, shale, coal and sandstone fragments.
Samples at 10.0 feet.		
17-23-25	10.0 - 11.5	Refuse material, grayish-black (N2), sandy clay, very-fine-grained, coal and shale fragments (2 mm), sandstone fragments (6 to 12 mm). At 13.0 feet - sandstone fragments up to 50 mm.
6-9-9	20.0 - 21.5	Refuse material as above, slightly more clay. At 24.0 to 25.0 feet - large sandstone fragments (45 mm).
7-11-25	25.0 - 26.5	Refuse material, grayish-black (N2), sandy clay, very-fine-grained, coal and shale fragments (2 mm), sandstone fragments (6 mm).
7-10-21	30.0 - 31.5	Refuse material, grayish-black (N2), sandy to silty clay, very-fine-grained, coal and shale fragments (2 mm), sandstone fragments (6 to 12 mm).
10-14-30	35.0 - 36.5	Refuse material, grayish-black (N2), sandy clay, fine-grained, shale and coal fragments (2 mm), clay layers, grayish-black (N2), moist, medium-light-gray (N6) stain.

PELA

MAXINE ROCK DISPOSAL AREA

Well No. MO-9
(continued)

Drilled: 7/29/83

Blow Counts	Interval Sampled (feet)	Description
11-19-25	40.0 - 41.5	Refuse material as above to 41 feet, very moist. At 41 feet - refuse material, medium-gray (N5), silty clay, more clay than above, light-gray (N7) stain.
17-18-15	41.5 - 43.0	Refuse material, medium-dark-gray (N4), silty clay, clay lenses "layered" between refuse material, very small fragments (1 mm) of "red rock".
Augered to 45.0 feet. (to allow for cave in)		Refuse material as above.

Drilling completed.

PELA

APPENDIX III

Results of Percolation Tests

(Transmitted as letter report to
Alabama By-Products Corporation on January 11, 1983)

PELA

PERCOLATION TESTS
MAXINE OLD ROCK DISPOSAL AREA

Tests were performed to determine rates of infiltration at various sites in and near the old rock disposal area at the Maxine Mine on December 20 and 21, 1982, in accord with work elements described in the outline for assessment of hydrologic conditions (letter to Douglas R. Cook, July 23, 1982). The percolation test sites are located on figure 1.

Methodology

The percolation tests were performed according to "Sanitarian's Handbook, Theory and Administrative Practice for Environmental Health", fourth edition, prepared by Ben Freedman, M.D., M.P.H. A 6-inch diameter hole was dug, 18 to 20 inches deep at each site. The bottom and sides of the hole were scratched and roughened to provide a natural soil interface. All loose materials were removed from the hole and two inches of pea gravel were placed in the hole to prevent bottom scouring. The hole was then filled with 12 inches of water over the gravel. After the water seeped away, the test began. Six inches of water was then poured into the hole and water-level measurements were taken every ten minutes for an hour, keeping the hole filled with 6 inches of water. The decline which occurred within the final ten minutes was used to calculate the rate of infiltration.

FIGURE 1. LOCATION OF PERCOLATION TEST SITES.

APPROXIMATE SCALE 1"=340'

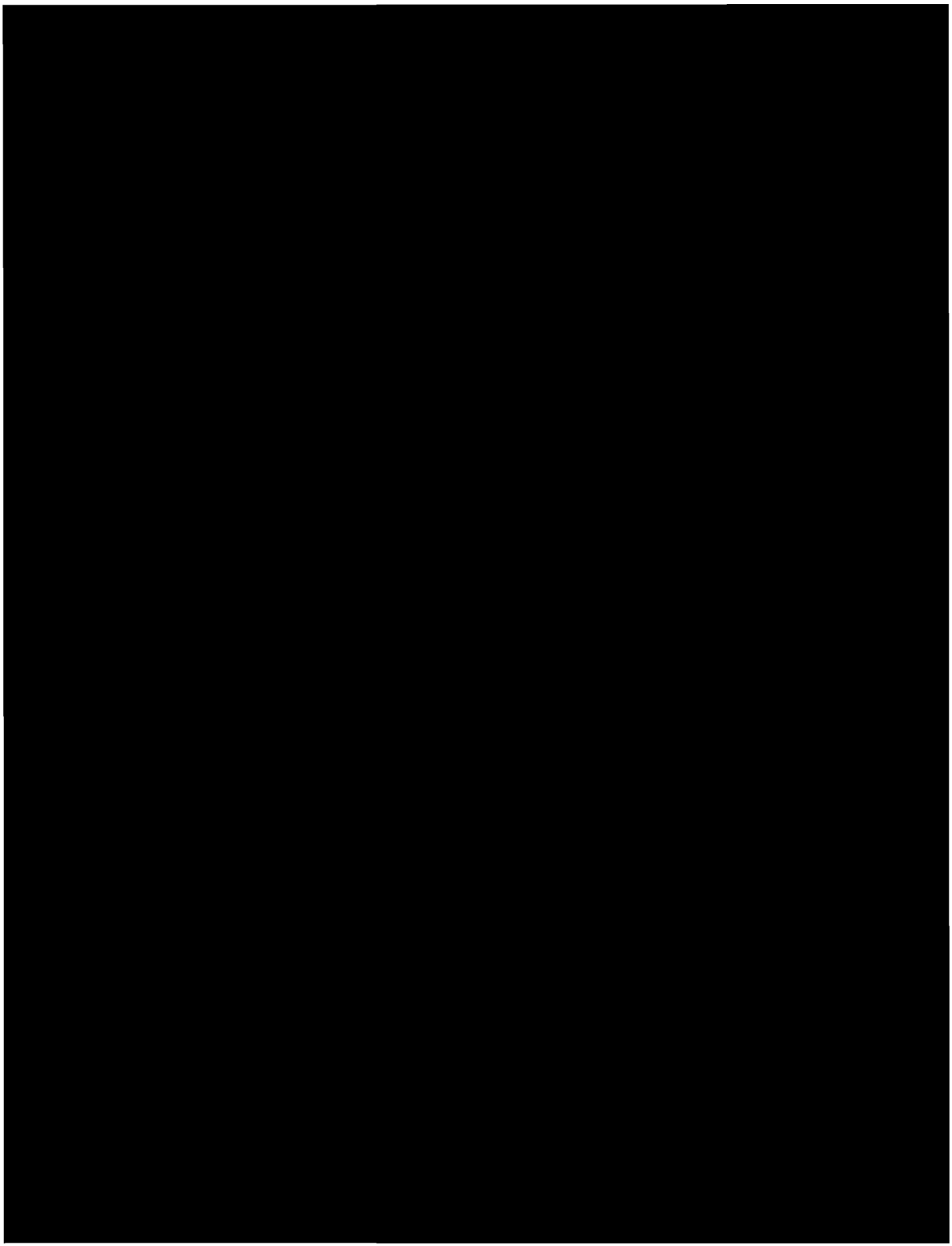
Prepared by:
P.E. LaMOREAUX & ASSOCIATES

Test Results

The results of the percolation tests performed are presented in table 1. The lowest rates of infiltration were at sites 5 and 6, both undisturbed, natural overburden areas near the rock disposal. The highest rate of infiltration was at site 1, in the valley fill below the dam. The average infiltration rate for the tests performed in the rock disposal area (excluding sites 5 and 6 in the undisturbed area) is 17.4 inches/hour (1.3×10^{-2} cm/sec). In comparing the old material with undisturbed terrain, the rate of infiltration is about 2.3 times greater in the old material.

Table 1. Results of percolation tests.

Site Number	Rate of Infiltration	
	inches/hour	centimeter/second
1	25.4	1.8×10^{-2}
2	19.8	1.4×10^{-2}
3	13.4	9.7×10^{-3}
4	20.5	1.5×10^{-2}
5	5.6	4.1×10^{-3}
6	7.8	5.6×10^{-3}
7	9.9	7.1×10^{-3}
8	15.5	1.1×10^{-2}



ALABAMA BY-PRODUCTS CORPORATION

MAXINE MINE

SUPPLEMENT TO PERMIT APPLICATION

FOR

COAL PROCESSING WASTE DISPOSAL

JULY 30, 1982

ALABAMA BY-PRODUCTS CORPORATION

MAXINE MINE

SUPPLEMENT TO PERMIT APPLICATION

FOR

COAL PROCESSING WASTE DISPOSAL

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ALABAMA BY-PRODUCTS CORPORATION
MAXINE MINE
SUPPLEMENT TO PERMIT APPLICATION
COAL PROCESSING WASTE DISPOSAL

Part III, B., 2-d - Submit detailed design plans, which comply with Sections 784.25 (a)(2 and 3) and 817.81 - 817.85, for each coal processing waste bank to be constructed on the increment currently proposed to be mined.

A new coal processing waste bank is proposed for Maxine Mine and will be located as shown by Area 1 on Map No. 405. This area covers approximately twenty-five (25) acres and is presently covered by forest. The natural ground is gently sloping with an average grade of nine (9%) percent. A sediment basin will be constructed downgrade from the coal processing waste bank to handle the designed run-off. (See design calculations for Pond 023 attached.) Diversion ditches of sufficient size will be constructed around the waste bank as shown on Map No. 405 and will be maintained to handle natural run-off. (See design calculations attached.) Natural vegetation barriers will be left between the waste bank and the sediment basin, private property, and the adjacent county road. All trees and stumps will be removed from the entire proposed waste bank site but the topsoil and clay will be removed from only that portion proposed for initial use. As additional area is required the topsoil and clay will be removed and either stored for later use or placed on the outslope of the waste bank as it is formed. After the topsoil and clay are removed from the initial area within one (1) foot of bedrock, the remaining clay will be compacted by machinery prior to placement of any preparation plant waste. This will serve to form an impermeable layer between the processing waste and the bedrock. When placement of coal processing waste has been completed, the top surface will be covered with one foot (1') of clay, graded to allow surface run-off in accordance with Section 817.71-h of the Regulations, and revegetated for compatibility with the natural surroundings. No depressions or impoundments will be left on the surface of the fill.

Outslopes of the waste bank will be maintained on 1v:2h (50 percent) and will be covered with one foot (1') of clay and revegetated.

One foot (1') of clay is proposed for covering the waste bank because experience indicates that Sections 817.11 - 817.117 can be met. If these sections can be met, the State Regulatory Authority can allow less than four feet (4') of cover material. (See Section 817.85(d). There are several examples of vegetation in the form of native grasses and trees growing on less than one foot (1') of clay cover over old waste material in the general vicinity of the proposed new site.

The coal processing waste will be hauled by off-highway truck or by wheel tractor-scraper (pan). In both cases the waste will be placed in layers two feet (2') thick or less and compacted in accordance with Section 817.85(c)(1 and 2) of the State Regulatory Authority Regulations. If the waste is hauled by truck it will be spread by dozer and compacted with a sheep-foot type roller. If it is hauled by wheel tractor-scraper. the waste will be dumped in thin layers and compacted by the wheel tractor-scraper as it runs over the previously dumped material with a loaded tractor-scraper. This procedure has been very successful at some of our other operations. As the coal processing waste is placed and compacted, tests will be run to determine the percent of compaction. If compaction does not meet ninety percent (90%) of the maximum by density as specified in Section 817.85 of the Regulations, layers of clay will be placed periodically between layers of coal processing waste.

Cross sections showing the original ground elevations and the proposed final configuration of the waste bank are shown on Exhibit 300-B attached.

The America Coal Seam which lies approximately two hundred seventy-five feet (275') below the surface proposed for the new waste bank has been previously mined. Mining of the seam which is approximately sixty inches (60") in thickness occurred during the period 1956 to 1969. Since the coal seam is relatively thin (approximately sixty inches (60");

occurs at a depth of two hundred seventy-six feet (276") below the surface; is overlain by thick sandstone and shale near the surface; and was mined 13 to 26 years ago, any new subsidence will be minimal and should not affect the stability of the waste bank. With reference to the Permit Application submitted on July 20, 1982, Section III-J, it is indicated that subsidence under these conditions should not be more than two feet (') and when an area is completely undermined the subsidence should be universal except at the extreme mining limits. The proposed waste bank area has been visually inspected and no indication of subsidence was found. If subsidence did occur, it has evidently stabilized over the long time period. Map No. 300 is attached to show the America Seam mining below the proposed waste site.

The proposed waste bank site is in Jefferson County and is presently zoned A -1. Its use as a waste bank will depend on the application for and approval of rezoning to I-3. This application will be made to the Jefferson County Zoning Commission immediately upon approval of the plan by the Alabama Surface Mining Commission.

One other approval from Jefferson County will also be required. A plan or application must be submitted and approved by the Jefferson County Highway Department to cross a county road with off-highway trucks near the proposed waste bank site. This does not appear to be a problem at this time.

The hydrologic and geologic study of Area 1 is addressed by a report from P. E. LaMoreaux in a separate section of this application.

In conjunction with the application for a new coal processing waste bank several other areas are addressed as follows at the request of the Alabama Regulatory Authority.

Area 2 (Map No. 405), ACTIVE COAL PROCESSING WASTE BANK

The area as outlined has been an active coal processing waste bank since the Surface Mining Control and Reclamation Act became effective

May 3, 1978. This area will continue to be used until the new site (Area 1) is approved and constructed. At that time, the present site will be abandoned and reclaimed by grading the surface to drain into a ditch that collects surface run-off and will carry the run-off to the river via a sediment basin while bypassing the old refuse in the base of the valley. The surface will be covered with one foot (1') of clay and revegetated as outlined in Part IV of the Maxine Permit Application. The aforementioned sediment basin will be properly reclaimed and vegetated after the vegetation has stabilized on the processing waste bank.

A diversion ditch will also be constructed on the east side to divert surface run-off from the old refuse pile around the reclaimed waste bank. This run-off will go through a sediment basin and finally to the Warrior River. The sediment basin serving this diversion ditch will remain to trap any sediment as a result of reterracing the old waste bank and reworking the eastern diversion ditch. After the run-off sediment load has subsided, the sediment basin will be reclaimed by sowing pine tree seeds since its remote location prohibits a covering of clay. The attached Exhibits 300 A-1 and 300 A-2 show a detailed cross section of the proposed final configuration of the present coal processing waste bank and diversion ditches after reclamation has been completed. A separate report by P. E. LaMoreaux and Associates entitled "Work Elements Proposed for Assessment of Hydrologic Conditions of the Capped Area" outlines the proposed tests and studies to show that the coal processing waste deposited since 1978 is not contributing to the water quality of the water originating in the pre-1978 coal processing waste. When these tests are conclusive, Alabama By-Products Corporation proposes to abandon the entire area of pre- and post-1978 coal processing waste banks (including and adjacent to Area 2).

Area 3 (Map No. 405) ACTIVE BREAKER ROCK WASTE BANK

This area is located adjacent to the Preparation Plant and will be reclaimed and abandoned once the new waste bank site (Area 1) is approved allowing the breaker rock to be deposited with the coal processing waste.

Reclamation will consist of covering the remainder of the waste bank with one foot (1') of clay; plant vegetation as outlined in Part IV of the Maxine Permit Application; constructing the remainder of the diversion ditches; and establishing a sample collecting station near the toe of the waste bank. Water samples will be collected bi-monthly and analyzed for pH, iron and manganese. A record of the sampling and analyses will be maintained at the Mine Office. A final proposed configuration of the breaker rock waste bank is shown by profile drawings on attached Exhibits 300 A-3 and 300 A-4.

Area 4 (Map 405) SURFACE RUN-OFF SEDIMENT BASIN

Area 4 is an existing sediment basin designed to collect surface run-off from the Preparation Plant and Rail Yard area. This basin has a NPDES No. 020 but discharge is kept to a minimum by a float operated pump. An agitator has been installed in the basin to keep the solids suspended for ease in pumping the slurry back to the Preparation Plant sump and eventually to the Black Water Pond for final settling. It is proposed to maintain this "no discharge" system as it is now operating so long as the Preparation Plant is being used for coal production.

Area 5 (Map 405) PERIMETER BERM

Area 5 is an existing clay berm designed to control and direct surface run-off from the Preparation Plant and Rail Yard area into Sediment Basin No. 4 and out of the small stream flowing just below the berm. This berm will be maintained in its present condition through the active life of Maxine Mine. The stream below the berm will be monitored above and below the Black Water dam bi-monthly and the records filed at the Maxine Mine Office. In times of very low flow and if the sampling so indicates, a chemical additive will be administered to the stream for pH control.

PELA

Geologic and Hydrologic Assessment of the Proposed Rock Disposal Area, Maxine Mine

Prepared for

Alabama By-Products Corporation
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Prepared by

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July 30, 1982

P.E.LaMoreaux & Associates

PELA

CONTENTS

FIGURES

PELA

GEOLOGY

The geology of the area proposed for rock disposal at the Maxine Mine is based on a field reconnaissance and an analysis of drill hole data. Although information on the subsurface geology was available from drill holes previously drilled, a core hole was completed on July 27, 1982, to verify the lithologic descriptions in the other drill holes. The results of the coring indicated the logs to be accurate. A geologic cross section for the area based on drill hole data is shown in figure 2. The location of the cross section is shown in figure 1. Detailed lithologic logs of the drill holes utilized for the cross section are presented in Appendix A.

The geology for the area is comprised of the Pottsville Formation of Pennsylvania age. A soil and a weathered bedrock zone averaging 13 feet in thickness comprise the surficial material throughout the proposed rock disposal area.

The lithology of the surface for the proposed rock disposal area is comprised of different lithologic units as the topography of the area traverses a range in elevation. The stratigraphically highest unit that crops out in the area is a shale that at the area's highest elevation is as much as 30 feet thick. This shale unit is underlain by a sandstone unit that crops out at elevations ranging from 460 to 435 feet above mean sea level and is 20 to 25 feet thick in the area. This sandstone unit is underlain by a sandy shale, the

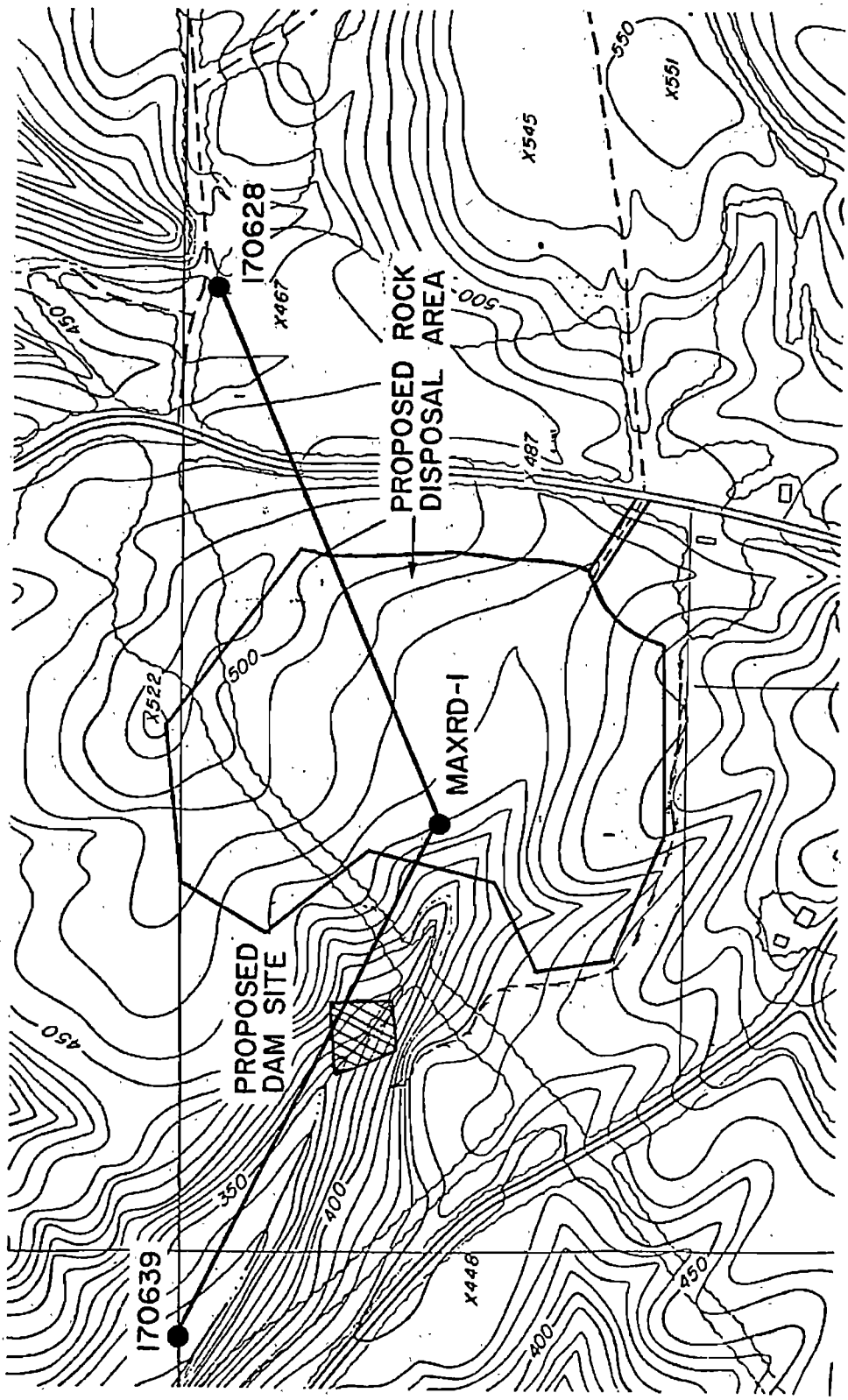

Figure 1. LOCATION OF GEOLOGIC CROSS SECTION

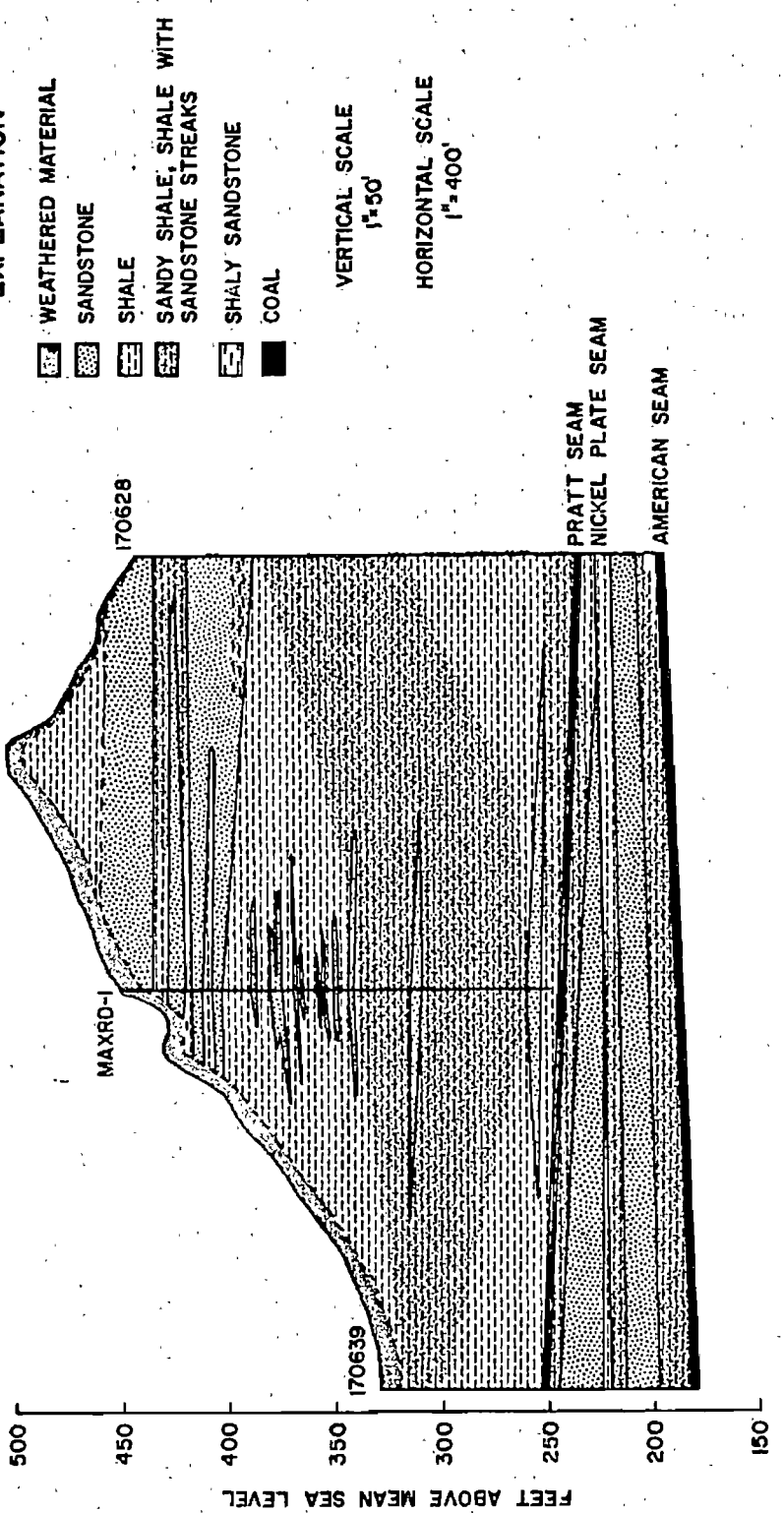

Figure 2. GEOLOGIC CROSS SECTION.

stratigraphically lowest lithologic unit that crops out in the proposed rock disposal area. The sandy shale is approximately 15 feet thick in the east and 20 feet thick, containing a 7 foot sandstone lens in the west. Underlying the sandy shale unit is a sandstone unit as much as 20 feet thick in the eastern portion of the area that thins and is interbedded with a shale unit in the west. A thick shale to sandy shale unit, as much as 150 feet thick, underlies the sandstone. This shale/sandy shale unit locally contains several thin sandstone lenses (fig. 2). The Pratt seam underlies this shale unit at an elevation of 250 feet above mean sea level. The Pratt coal seam is underlain by a thin sandy shale unit, 10 feet thick, underlain by a sandstone unit 10 feet thick. The Nickel Plate coal seam underlies the sandstone unit. Underlying the Nickel Plate coal seam is a thin sandy shale unit, 5 feet thick, underlain by a 20 foot sandstone unit which overlies a 15 foot sandy shale. This sandy shale unit overlies the American coal seam at an elevation of 190 feet above mean sea level. The American coal seam is the coal seam that has been removed by the Maxine Mine.

There are no known faults in the vicinity of the proposed rock disposal area.

HYDROLOGY

A field reconnaissance of the proposed rock disposal area and dam site was performed during the week of July 26, 1982. No ground-water discharge from springs or seeps was observed in the area.

The water-bearing unit that has been developed in the area or has potential for development is a sandstone unit associated with the Thomas coal seam. This unit is hydraulicly isolated on the hills in the surrounding areas.

The only area of domestic water development in the vicinity of the proposed rock disposal area is north of the site where eight wells were inventoried. The use of water wells has been discontinued since the start of a public water system. The interpretation of the occurrence and availability of ground water based on core drilling MAXRD-1 indicated a very low permeability for the thin sandstone layers penetrated and a maximum of ± 1 gallon per minute available from the 200 feet of section penetrated.

No flowing streams were observed in the rock disposal area at the time of the reconnaissance. A draw located to the west of the site characteristicly is a wet-weather drainage channel.

The engineering design for the site will control and monitor the surface-water runoff from the site and will prevent any infiltration of water.

PROBABLE HYDROLOGIC CONSEQUENCES

The present drainage in the area proposed for rock disposal is underlain by about 13 feet of permeable unconsolidated material. Part of the rain that falls infiltrates into this zone and part is discharged as direct runoff. However, the present engineering design provides for an impervious cap which will retard infiltration. Therefore, the runoff characteristics during storm event will be altered providing increased runoff.

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APPENDIX A

Lithologic Logs of Drill and Core Holes in the Rock Disposal Area

PELA

LITHOLOGIC LOG
MAXRD-1

Owner: Alabama By-Products Corporation
Location: NW¼; NE¼, Sec. 9, T. 17 S., R. 6 W.
Date started: 7/26/82
Date completed: 7/27/82

Depth	Description
0 - 5'0"	No recovery.
5'0" - 5'4"	Sandy clay, medium light gray to medium gray, quartzose, silt to very fine-grained, subrounded, shale fragments, iron staining.
5'4" - 5'8"	Weathered sandstone, pale brown to moderate brown quartzose, mica, medium to fine grained, subangular, plant debris, iron staining, dark accessory mineral, possible hornblende.
5'8" - 5'11"	Sandy clay, moderate yellowish brown to moderate brown, subangular to subrounded, shale fragments, iron staining.
5'11"- 6'7"	Weathered sandy shale, dusky brown to moderate brown, quartzose, mica, very fine grained, subrounded, iron staining.
6'7" - 6'9"	Weathered sandy shale, dusky brown to moderate brown, quartzose, mica, very fine grained, subrounded, iron staining.
6'9" - 7'5"	Weathered sandstone with shale streaks, moderate yellowish brown to dark yellowish brown, quartzose, mica, silty grained, subrounded to subangular, slightly clayey in thin streaks.
7'5" - 7'9"	Weathered sandstone with shale streaks, moderate yellowish brown to dark yellowish brown, quartzose, mica, silty to very fine grained, subangular to subrounded, roots and leaves in layers.
7'9" - 8'6"	Sandy clay, dark yellowish orange to moderate yellowish brown, quartzose, mica, silty to very fine grained, subangular to subrounded, abundant plant debris, shale fragments, minor dark accessory mineral.

PELA

MAXRD-1 - continued

Depth	Description
8'6" - 9'0"	Clay, moderate brown, silty grained, abundant plant debris, shale fragments.
9'0" - 10'0"	Not recovered.
10'0"- 10'4"	Sandstone, medium gray to medium dark gray, quartzose, mica, massive, coarse to medium grained, subrounded.
10'4"- 10'7"	Sandstone with shale streaks, medium gray to dark gray, quartzose, mica, coarse to medium grained, subrounded.
10'7"- 11'5"	Sandstone, medium gray to medium dark gray, quartzose, mica, massive, coarse to medium grained, subrounded.
11'5"- 12'1"	Sandstone with shale streaks, medium gray to medium dark gray, quartzose, mica, coarse to medium grained, subrounded.
12'1"- 12'10"	Shale with sandstone streaks, medium dark gray to dark gray, quartzose, mica, minor pyrite rippled, fine grained, subrounded.
12'10"-13'0"	Sandy shale, medium dark gray to dark gray, quartzose, mica, fine grained, subrounded, iron staining, dark accessory mineral, possible hornblende.
13'0"-14'10"	Sandy clay, dark gray, mica, quartzose, fine to very fine grained, subrounded, iron staining.
14'10"-16'5"	Sandy shale, medium dark gray to dark gray, quartzose, mica, rippled, churned, fine grained, subrounded.
16'5"-17'6"	Shale with sandstone streaks, dark gray, minor mica, rippled, very fine grained, subangular, some plant stems.
17'6"-17'11"	Shaly clay, medium dark gray to dark gray, minor mica, quartzose, very fine grained, subrounded, plant stems and leaves.
17'11"-20'0"	Shale with sandstone streaks, dark gray, minor mica, quartzose, very fine grained, subrounded, some iron staining between shale layers.

PELA

MAXRD-1 - continued

Depth	Description
20'0"-23'0"	Sandstone, medium light gray to medium gray, milaceous, quartzose, pyrite, fine to medium grained, subangular, vertical calcite vien 1/16" wide throughout.
23'0"-29'8"	Sandstone, medium light gray to medium gray, micaceous, quartzose, pyrite, medium grained, subangular, shale fragments.
29'8"-30'0"	Sandstone, medium light gray to medium gray, micaceous, quartzose, medium to fine grained, subangular, iron staining.
30'0"-33'1"	Sandy shale, medium dark gray to dark gray, mica, quartzose, fine grained, subrounded.
33'1"-37'11"	Sandstone, medium gray to medium dark gray, mica, quartzose, medium grained, subangular, shale fragments, dark accessory mineral, possible hornblende, at 34'11" possible diagonal fracture 1" long with iron staining.
37'11"-40'	Sandstone, medium gray to medium dark gray, mica, quartzose, medium grained, subangular, shale fragments, dark accessory mineral, possibly hornblende, calcite vien at 38'2" and at 39'9", both 3 inches in length.
40'1"-41'1"	Shale, dark gray, silty, minor mica.
41'4"-42'9"	Sandy shale, medium dark gray, mica, quartzose, fine to very fine grained, subrounded to subangular.
42'9"-43'4"	Interbedded sandstone and shale, medium gray to medium dark gray, mica, quartzose, very fine to fine grained, subrounded to subangular.
43'4"-45'9"	Sandstone with shale streaks, medium dark gray, mica, quartzose, churned, fine grained, subangular.
45'9"-47'3"	Shale, dark gray, minor mica, silty.
47'3"-50'0"	Sandy shale, medium dark gray to dark gray, mica, fine to very fine grained, subrounded mudflow at 49'4" to 49'6".

PELA

MAXRD-1 - continued

Depth	Description
50'0"-50'5"	Interbedded sandstone and shale, medium gray to medium dark gray, mica, quartzose, very fine to fine grained, subangular.
50'5"-51'8"	Shale with sandstone streaks, medium dark gray, minor mica, very fine grained to silty, subangular to subrounded.
51'8"-53'6"	Shale, dark gray, minor mica, silty, subangular to subrounded.
53'6"-56'2"	Shale with sandstone streaks, medium dark gray to dark gray, mica, very fine grained to silty, subangular to subrounded.
56'2"-58'1"	Sandy shale, medium dark gray, mica, very fine grained, subangular.
58'1"-59'5"	Shale with sandstone streaks, medium dark gray to medium gray, mica, fine to very fine grained, subangular.
59'5"-60'0"	Sandy shale, medium dark gray, mica, very fine grained, subangular.
60'0"-61'7"	Sandstone with shale streaks, medium dark gray, mica, quartzose, fine grained, subangular, scattered plant debris.
61'7"-65'5"	Interbedded sandstone and shale, medium dark gray to dark gray, mica, quartzose, streaked, fine to very fine grained, subangular, plant debris in sandstone.
65'5"-66'1"	Sandstone with shale streaks, medium dark gray, mica, quartzose, fine grained, subangular.
66'1"-66'11"	Shale with sandstone streaks, medium dark gray, minor mica, very fine grained to silty, subangular to subrounded.
66'11"-67'6"	Sandy shale, medium dark gray to dark gray, very fine grained, subangular, grading to shale at 67'5".

PELA

MAXRD-1 - continued

Depth	Description
67'6"-70'0"	Sandstone with shale streaks, medium dark gray to dark gray, mica, quartzose, rippled, fine grained, subangular.
70'0"-71'0"	Sandstone with shale streaks, medium dark gray to dark gray, mica, quartzose, rippled, fine grained, subangular, scattered borrowing.
71'0"-71'8"	Interbedded sandstone and shale, medium gray to medium dark gray, mica, quartzose, fine to medium grained, subangular.
71'8"-74'11"	Sandy shale, medium gray to medium dark gray, mica, quartzose, churned, fine grained, subangular.
74'11"-76'11"	Interbedded sandstone and shale, medium gray to medium dark gray, mica, quartzose, fine to very fine grained, subangular to subrounded.
76'11"-78'11"	Sandy shale, medium gray to medium dark gray, mica quartzose, fine grained, subangular.
78'11'-80'0"	Sandstone with shale streaks, medium dark gray, mica, quartzose, fine grained, subangular.
80'0"-82'9"	Interbedded sandstone with shale, medium gray to medium dark gray, mica, quartzose, fine to medium grained, subangular, plant debris throughout.
82'9"-90'0"	Not recovered.
90'0"-97"0"	Interbedded sandstone with shale, medium gray to medium dark gray, mica, quartzose, rippled and streaked, fine grained, subangular, churned in parts.
97'0"-98'7"	Sandstone with shale streaks, medium dark gray to dark gray, mica, quartzose, very fine to fine grained, subangular.
98'7"-100'0"	Shale with sandstone streaks, medium dark gray to dark gray, mica, quartzose, very fine to fine grained, subangular.

PELA

MAXRD-1 - continued

Depth	Description
100'0"-101'0"	Sandstone with shale streaks, medium dark gray to dark gray, mica, quartzose, rippled, fine grained, subangular.
101'0"-105'7"	Sandy shale, dark gray, mica, very fine grained to silty, subangular to subrounded.
105'7"-108'5"	Interbedded sandstone and shale, medium dark gray to dark gray, mica, quartzose, rippled, fine grained, subangular.
108'5"-110'0"	Not recovered.
110'0"-120'0"	Shale with sandstone streaks, dark gray, rippled and churned, very fine grained, subangular to subrounded, minor amount of mica.
120'0"-130'0"	Sandy shale, dark gray, mica, quartzose, fine grained to silty, subangular.
130'0"-131'7"	Same as above.
131'7" - 131'7.5"	Sandy clay, medium dark gray, silty, subangular to subrounded.
131'7.5" - 132'2.5"	Sandstone, medium dark gray, mica, quartzose, medium grained, subangular, shale fragments.
132'2.5" - 136'9"	Shale with sandstone streaks, medium dark gray to dark gray, mica, very fine grained, subangular to subrounded.
136'9"-139'0"	Interbedded sandstone and shale, medium gray to medium dark gray, mica, quartzose, fine grained, subangular to subrounded.
139'0"-140'0"	Interbedded sandstone and shale, medium gray to medium dark gray, mica, quartzose, rippled, fine grained, subangular to subrounded.
140'0"-148'0"	Sandy shale, dark medium gray, very fine to fine grained, subangular, minor amount of mica.
148'0"-150'0"	Shale with sandstone streaks, medium dark gray to dark gray, mica, very fine grained, subangular to subrounded.

PELA

MAXRD-1 - continued

Depth	Description
150'0"-153'0"	Sandy shale, dark medium gray, very fine grained, subangular to subrounded, minor amount of mica, vertical calcite vien throughout.
153'0"-160'0"	Sandy shale, dark medium gray, minor mica, fine to very fine grained, subangular.
160'0"-170'0"	Same as above.
170'0"-174'8"	Shale with sandstone streaks, dark medium gray to medium gray, mica, very fine grained, subangular to subrounded.
174'8"-180'0"	Sandy shale, dark medium gray, mica, very fine grained, subangular to subrounded.
180'0"-190'0"	Same as above.
190'0"-197'1"	Interbedded sandstone and shale, dark medium gray to dark gray, mica, quartzose, fine grained, subangular.
197'1"-200'	Shale with sandstone bands, dark gray, minor mica, very fine grained to silty, subangular to subrounded.
TOTAL DEPTH:	200 feet.

PELA

OUTLINE

WORK ELEMENTS PROPOSED FOR ASSESSMENT OF HYDROLOGIC CONDITIONS OF THE CAPPED AREA, MAXINE ROCK DISPOSAL AREA

1. Acquisition and assessment of sequential aerial photography for utilization in development of monitoring program.

   Will require use of ABC's photography (stereo pairs) 1956, 1979 and 1982 and possibly acquisition of other flights from local agencies.

2. To compare rates of infiltration of old material and capped area. Complete field tests at numerous sites on old material and capped area.

   Test borings will be made and rate of infiltration of known volume of water measured.

3. Monitoring program

Ground-water monitoring program.

Minimum of 4 wells may be installed prior to completion of capping).

a. One well up-dip from capped area.

b. One well down-dip from capped area.

c. Two wells in capped area -- one shallow well and one deep well.

d. Initial test drilling may be required to determine thickness of old materials and to determine setting of screened intervals. Additional wells may be required pending evaluation of drilling phase.

   Wells will be cased with PVC casing with screened sections set at intervals to be monitored. The annulus between the casing and hole wall will be gravel packed and sealed with grout at the surface. Figure 1 illustrates well construction.

Monitor water level fluctuations by instrumentation of wells (Stevens Type-F recorders)

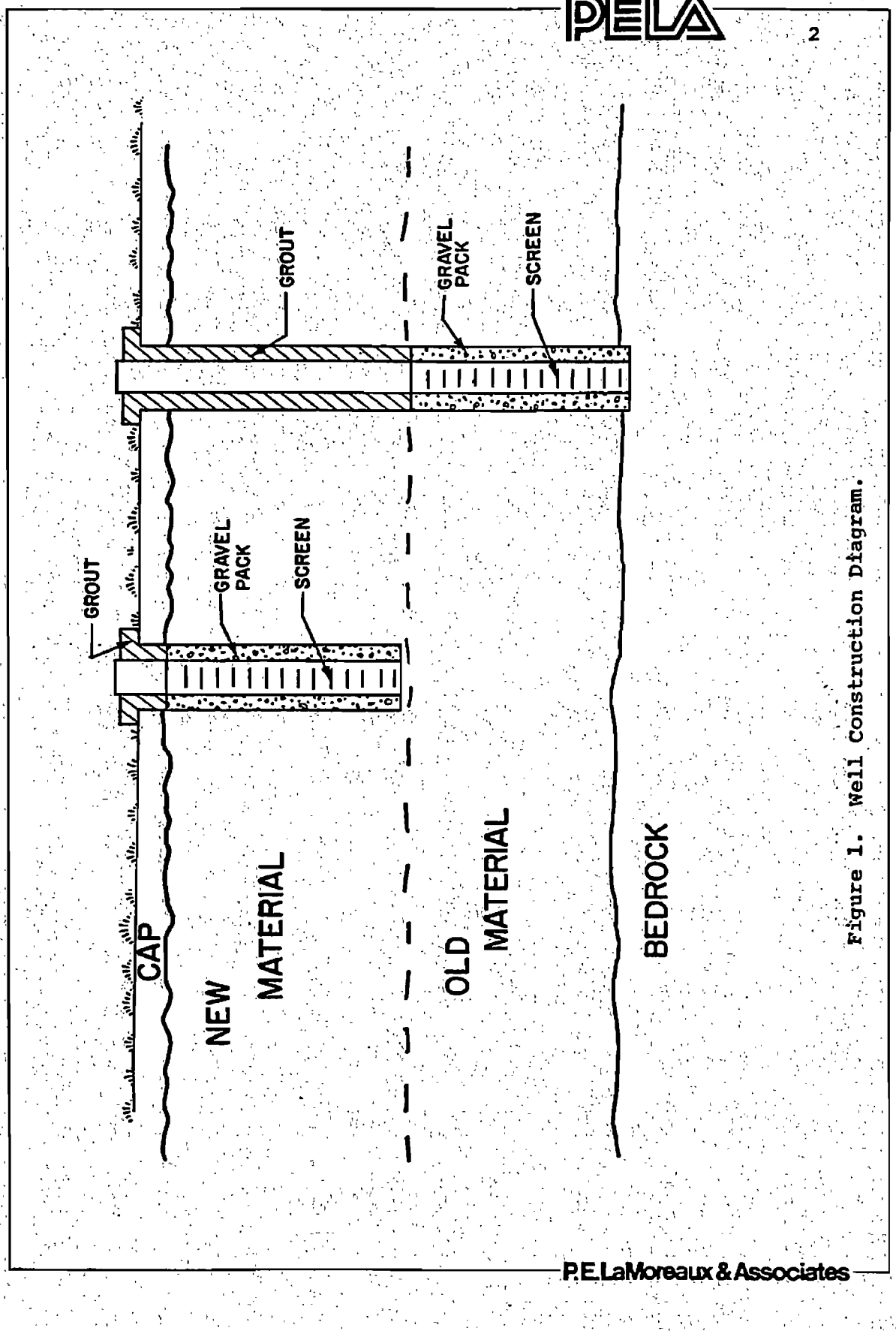


Figure 1. Well Construction Diagram.

Monitor ground-water quality on bi-monthly basis initially. Continued frequency dependent on evaluation of results.

Parameters to be monitored include: total iron, total manganese, total dissolved solids, total suspended solids and sulphate. Determinations will be made on site for pH, specific conductance and temperature.

Monitor ground-water direction and flow, concurrent with sampling, with ground-water flow meter (Model 30L).

The ground-water flow meter will be used to measure direction and flow of ground-water at each monitor well. The readings will be made at various intervals in each well to determine if directions and velocities vary to assess potential isolated flow zones.

Surface-water monitoring program.

With the establishment of diversion ditches to segregate run-off from old material and capped area, monitor and assess surface-water flow and quality.

Diversion Ditches

a. East side - run-off from old material.

b. West side - run-off from capped area.

Monitor flow and water quality initially on bi-monthly basis. Continued frequency dependent on evaluation of results.

Parameters to be monitored at 3 sites include: total iron, total manganese, total dissolved solids, total suspended solids and sulfate. Determinations will be made on site for pH, specific conductance and temperature. Flow will be measured with a current meter.

4. Ground-water and surface-water will also be monitored after storm events.

5. Monitoring on-site precipitation with Belforte rain gage already in operation.

6. It is essential to continue project work into wet season.

Duration of monitoring period not established. Monitoring will be continued until sufficient information is obtained to support study and satisfy

regulatory commission.

7. Monthly progress reports to include results of monitoring, assessment and associated graphics.

8. Final assessment report.

Figure 2 is a schematic illustrating the hydrologic assessment program (final well locations have not been established).

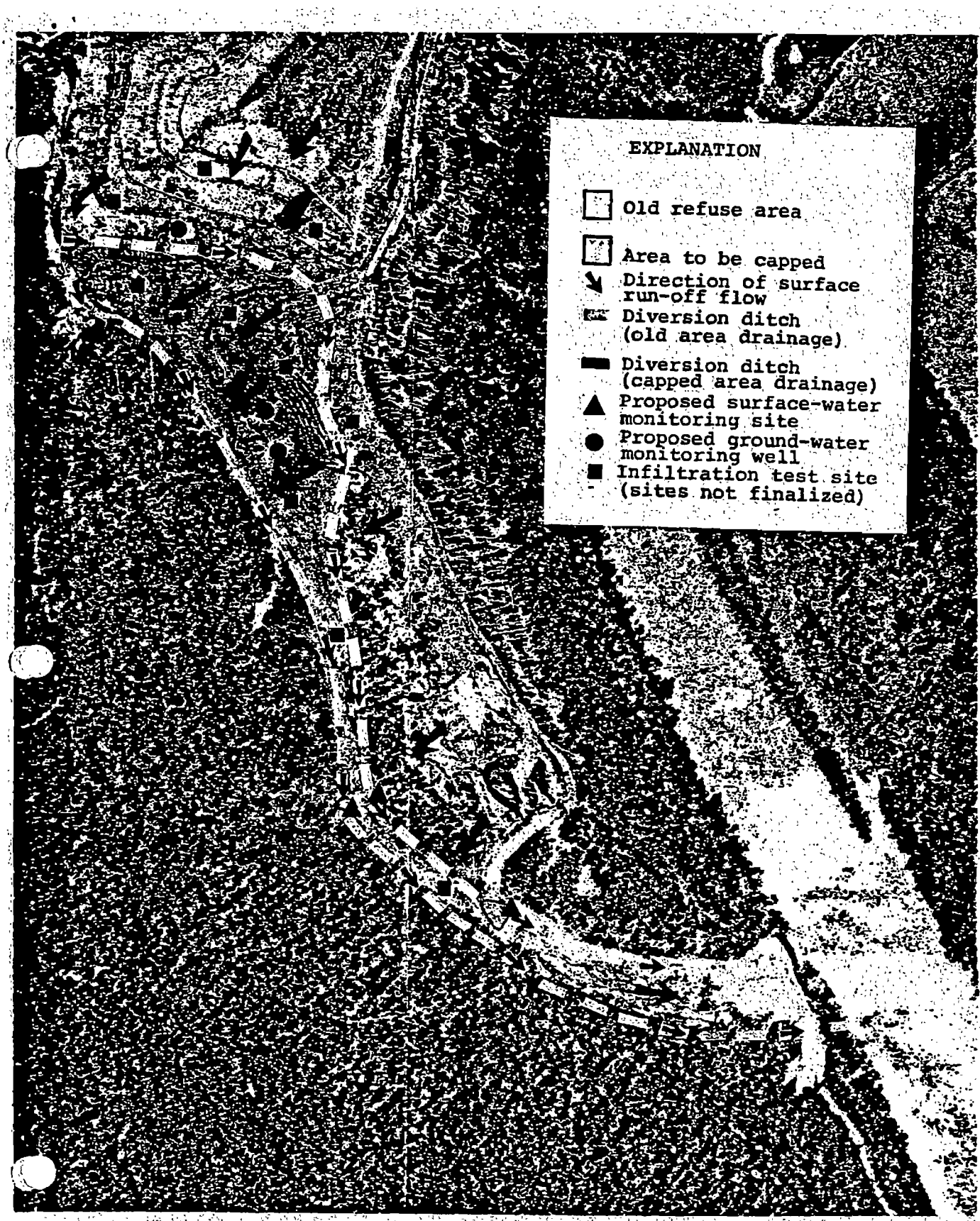


Figure 2. Schematic of hydrologic assessment program.

SPECIFICATIONS FOR
SEDIMENT CONTROL FACILITIES

1. Disturbed area drainage will be diverted into the sediment control facility.

2. The facility has been designed to contain a sediment volume of 0.1 acre-foot per acre of disturbed area. The storage area will be cleared of vegetation and available soil removed and stored during construction.

3. Dam and Spillway System Specifications:
   a. Top of Dam width - 20 feet.
   b. Upstream side slope - 1v:2h; Downstream side slope - 1v:3h.
   c. Key trench - 12 feet wide with 1v:1h side slopes. Depth of trench dependent upon depth to sound rock but in no case will be deeper than four (4) feet.
   d. All fill material used in construction of the dam shall be compacted to 90% density in accordance with ASTM D-698 (Standard Proctor) for the material used.
   e. Fill material shall be placed in twelve (12) inch lifts maximum and shall be free of roots and other deleterious material and stones larger than six (6) inches in diameter.
   f. The Principal Spillway will be PVC pipe (or similar material). (See specific design requirements for pipe size.)
   g. The Principal Spillway will be located in the dam so that effluent willnot be discharged onto the downstream face of the dam.
      (1). Anti-seep collars will be used at appropriate locations along the Principal Spillway pipe.
   h. The Spillway System is designed to safely discharge the peak runoff as follows:
      Principal Spillway - 10-year, 24-hour rainfall event
      Emergency Spillway - 25-year, 24-hour rainfall event
      over the drainage area.
   i. The Emergency Spillway will be located adjacent to the dam in undisturbed material and will have the following minimum hydraulic geometry:
      1. Entrance and exit slopes - 3% (Maximum)
      2. Control Section, length - 20 feet
      3. Side slopes - 1v:2h, unless cut in rock
   j. The Emergency Spillway will be lined with dumped rock as required to control erosion.
   k. Adequate freeboard based on routing the 25-year, 24-hour rainfall event through the facility is provided between the maximum calculated water surface elevation and the top of dam.
   l. The dam will have annual and perennial grasses sown on side slopes and the top of the dam upon completion of construction. Diversion ditches and adjacent disturbed areas will also have appropriate vegetation applied.

POND 023

I. WATERSHED DATA

Projected Total Disturbed Area:	25 acres
Undisturbed Drainage Area:	30 acres
Total Drainage Area:	55 acres
Less Area Above Diversion Channel:	10 acres
Total Effective Drainage Area:	45 Acres

II. RAINFALL-RUNOFF CALCULATIONS

Area	Soil Type	Acres	CN	CN x A
Disposal Area	A*	25	80	2000
Woods	B	10	55	550
Light Vegetation	B	10	65	650
		45		3200

*Consists primarily of coarse refuse.

$$\text{Weighted CN} = \frac{3200}{45} = 71.1$$

Use CN = 71

For 10-year, 24-hour rainfall event: P = 6.0 inches, R = 2.9 inches
For 25-year, 24-hour rainfall event: P = 6.8 inches, R = 3.6 inches

Assume a FLAT Slope: 3%

From USDA Standard Drawing No. ES-1026, Sheets 3-4 of 21:

For CN 71, Peak Discharge is:

P	Q
6.0 inches	32 cfs
6.8 inches	42 cfs

III. WATER AND SEDIMENT STORAGE CALCULATIONS

A. Water

$$V_{10} = \frac{RA}{12} = \frac{(2.9)(45)}{12} = 10.9 \text{ acre-feet}$$

$$V_{25} = \frac{RA}{12} = \frac{(3.6)(45)}{12} = 13.5 \text{ acre-feet}$$

B. Sediment

The manner in which the disposal area will be cleared and grubbed of vegetation and, ~~in turn~~, the refuse ~~will be~~ placed will reduce sediment load to the sediment control facility. A strip ~~about 200 feet wide (+), running parallel to the dam,~~ will be cleared and grubbed and available soil removed. After additional preparation of the area is completed, coarse refuse will be placed in a con-

III. WATER AND SEDIMENT STORAGE CALCULATIONS, con't.

trolled manner, beginning in the area closest to the facility. Refuse placed in this manner will effectively trap and hold the majority of sediment which might erode from the disturbed area. As refuse placement advances, the main source of any sediment will be from the outslope of the refuse pile. Clearing and grubbing in advance of refuse disposal will be controlled so as to keep disturbance to a minimum and reduce contributing sediment. Any soil removed from the area will be temporarily stored until feasible to place the soil on a completed portion of the outslope of the refuse. Seeding and mulching will be done as soon as practicable on the areas which have been graded and soil placed.

An undisturbed vegetative area will be maintained between the sediment control facility and the toe of the refuse.

The following calculations reflect a conservative sediment load projected to be deposited in the sediment control facility:

Use 0.1 acre-foot of storage per acre disturbed

Required Sediment Storage Volume. $V_s = (0.1)(25) = 2.5$ acre-feet

IV. PRINCIPAL SPILLWAY DESIGN

A 12" diameter PVC pipe will be used for the Principal Spillway. The following equations and values were used to develope a Stage-Discharge Curve:

A. Weir Control: $Q = C_w B H^{\frac{1}{2}}$ where C_w = weir coefficient, B = weir length, 3.14 feet, H = head, feet

B. Orifice Flow: $Q = C_c A (2gh)^{\frac{1}{2}}$ where C_c = contraction coefficient, A = flow area = 0.785 sq. ft., $2g$ = gravitational constant, H = head, feet

C. Full Flow: $$Q = \sqrt{\frac{H_T + 10}{1.04}}$$

where $$H_T = \frac{Q^2}{2gA^2}\left[1+K_e+K_b+K_1 L\right]$$

where K_e, K_b, K_1 = losses, H_T = Total head

V. INFLOW HYDROGRAPH CALCULATIONS

Distance from most remote point to facility, L = 2100 feet (0.4 miles)
Difference in elevation, H = 150 feet

$$T_c = \left[\frac{11.9L^3}{H}\right]^{0.385} = \left[\frac{11.9(0.4)^3}{150}\right]^{0.385} = 0.13 \text{ hours} = D$$

Use $2T_c$ for overland flow with ground cover and other retarding factors.
Therefore, $T_c' = 2T_c = 2(0.13) = 0.26$ hours

V. INFLOW HYDROGRAPH CALCULATIONS, con't.

Lag....., $L = 0.6T_c' = 0.6(0.26) = 0.16$ hours

Time to Peak, $T_p = L + \frac{D}{2} = 0.16 + \frac{0.26}{2} = 0.29$ hours

Use $T_p = 0.3$ hours

$T_p = 0.25 + \frac{0.17}{2}$
$= 0.25 + 0.085$
$= 0.33$

$\Delta D = 0.4L = 0.4(0.16) = 0.06$ hours (±)

$\Sigma\Delta D = 7(0.06) = 0.45$ hours

$\Delta D = 0.4L = 0.4(0.25) = 0.10$
$\Sigma\Delta D = 0.70$

where P = ~~2.9~~ 6.0 inches

Time	P_x/P_{24}	Mass P	Mass Q
11.0	0.235 0.236	0.68 1.42	0 0.08
11.5	0.283 0.291	0.82 1.75	0 0.18
11.75	0.387 0.411	1.12 2.47	0.02 0.43
11.88	0.400 .529	1.16 3.19	0.03 0.86
12.0	0.663 0.660	1.92 3.96	0.23 1.39
12.5	0.735 .737	2.13 4.42	0.31 1.68
13.0	0.772 .774	2.24 4.64	0.36 1.84

Increment	Time	Mass Q	ΔQ	Δq	Y	YΔQ	120ΔQ	103ΔQ
	11.61	0.009 0.01	0.06					
ΔD_1			0.005	0.90 7.2 6.2	0.2	0.2	1.4	1.2
	11.67	0.014 0.32	0.03					
ΔD_2			0.005	0.90 15.6 13.4	0.4	0.4	6.2	5.4
	11.74	0.019 0.45	0.13					
ΔD_3			0.005	0.90 15.6 13.4	0.6	0.5	9.4	8.0
	11.80	0.024 0.58	0.24					
ΔD_4			0.005	0.90 28.8 24.7	0.8	0.7	23.0	19.8
	11.87	0.029 0.62	0.31					
ΔD_5			0.086	15.40 37.2 31.9	1.0	15.4	37.2	31.9
	11.93	0.115 1.13	0.11					
ΔD_6			0.095	17.02 19.2 16.5	2/3	11.3	12.8	11.0
	11.97	0.210 1.29	0.15					
ΔD_7			0.036	6.45 18.0 15.5	1/3	2.2	6.0	5.2
	12.06	0.246 1.44		124.6		30.7 cfs	96.0	82.5

$\Delta q_p = \frac{484A\Delta Q}{L + \frac{\Delta D}{2}} = 179.11\Delta Q$

$\frac{484\left(\frac{45}{640}\right)\Delta Q}{0.28} = 120\Delta Q$

$103\Delta Q$

80 cfs peak on inflow hydrograph

Note: Compare 10-year, 24-hour rainfall Peak Discharge from SCS, Q = 32 cfs to YΔQ = 30.7 cfs. Good!

Time Base of Hydrograph, $T_B = 2.67T_p + 0.6\ D$

$= 2.67(0.3) + 0.6(0.06)$

$T_B = 0.84$ hours (±)

See Page for Unit Hydrograph development.

VI. EMERGENCY SPILLWAY DESIGN

From Part II, Peak Discharge, Q = 42 cfs
Assume:
Spillway Crest Elevation, E_e = el. 397.0
Top of Dam....., E_d = el. 400

Use the Upper Darby Method for Spillway capacity and dimensions.

From Hydrograph calculations:
Hydrograph Family No. 3
$T_p = 0.7T'_c = 0.7(0.26) = 0.18$ hours

$$\frac{T_o}{T_p} = 25 \text{ (Revised)}$$

Assumed maximum water surface elevation, E_w = el. 397.5
Volume of water at el. 397.5....., V_{t_w} = 9.7 acre-feet ($=V_I$)

Volume of water at el. 396.5....., V_{t_c} = 8.9 acre-feet

$$V'_{sw} = V_{t_w} - V_{t_c} = 9.7 - 8.9 = 0.8 \text{ acre-feet}$$

$$\frac{V'_{sw}}{V_I} = \frac{0.8}{9.7} = 0.08$$

Assume $\frac{V'_{sp}}{V_I} = 0$ (which is not correct, because there will be discharge from the Principal Spillway)

From ES-603, Sheet 9 of 12: For $\frac{V'_{sw}}{V_I} = 0.08$ and $\frac{V'_{sp}}{V_I} = 0$,

$$\frac{Q_o}{Q_I} = 0.81$$

Therefore, $Q_o = 0.81Q_I = 0.81(42) = 34$ cfs Required Spillway Discharge Capacity

From ES-612, Sheet 1 of 3 and interpolating between values for L = 0' and L = 100', for L =50' and H_p = 1.0': Q/b = 2.53

Use Spillway width, b = 15 feet:

Q/b = 2.53, Q =2.53b = 2.53(15) = 38 cfs

Check Spillway adequacy: $Q > Q_o$?

$Q > Q_o$ = 38 cfs > 34 cfs OK!

VII. DESIGN ELEVATIONS

Top of Dam:	el. 400
Width:	W = 20'
Upstream Side Slope:	1v:2h
Downstream Side Slope:	1v:3h
Emergency Spillway Invert Elevation:	el. 397.0
Principal Spillway Invert Elevation:	el. 395.0
Pipe Slope:	2% min.
Trash Rack Diameter:	18" diameter, min.

MAXINE MINE

DESIGN OF DIVERSION CHANNELS

Permanent diversion channels must be designed to pass the runoff from a 10-year recurrence interval rainfall event. The Rational Method of determining Peak Discharge was used to calculate the design discharge for the diversion channels.

Channel 1 - Located northernmost above Area 2 as shown on Map No. 405

Drainage Area - 19.6 acres
Approximate Channel length - 1700 feet

Assume:
Maximum permissible channel velocity - 5 fps
Runoff coefficient - c = 0.75

Time of Concentration, $T_c = \frac{L}{60V} = \frac{1700'}{60(5)} = 5.67$ minutes

From Time - Intensity Curve for 10-year recurrence interval: i = 7.4 inches

$Q_p = ciA = (0.75)(7.4)(19.6) = 109$ cfs

Try a channel with the following dimensions and properties:

b = 6 feet
z = 2
n = 0.030
S_o = 0.7%

From calculations, normal flow depth of water is, y_n = 2.1 feet at V_n = 5.1 fps. OK!

Design Parameters:
Channel Depth - H = 2.1' + 0.3' freeboard = 2.4'
Side Slopes - z = 1v:2h
Channel Slope - S_o = 0.7%

Channel 2 - Located adjacent to, and southernmost, reclaimed refuse disposal area, as shown on Map No. 405

Drainage Area - 11.4 acres
Approximate Channel length - 4000 feet

Assume:
Maximum permissible channel velocity - 5 fps
Runoff coefficient c = 0.75

Time of Concentration, $T_c = \frac{L}{60V} = \frac{4000'}{60(5)} = 13.3$ munites

From Time - Intensity Curve for 10-year recurrence interval: i = 5.6 inches

$Q_p = ciA = (0.75)(5.6)(11.4) = 48$ cfs

Maxine Mine
Design of Diversion Channels, con't.
Page 2

Try a channel with the following dimensions and properties:

b = 6 feet
z = 2
n = 0.030
S_o = 1.2%

From calculations, normal flow depth of water is, y_n = 1.2 feet at V_n = 5.0 fps. OK!

Design Parameters:

Channel Depth - H = 1.2' + 0.3' freeboard = 1.5'
Side Slopes - z = 1v:2h
Channel Slope - S_o = 1.2%

Channel 3 - Located adjacent to reclaimed disposal area as shown on Map No. 405

Drainage Area - 9.4 acres
Approximate Channel length - 1500 feet

Assume :
Maximum permissible channel velocity - 5 fps
Runoff coefficient - c = 0.75

Time of Concentration, $T_c = \frac{L}{60V} = \frac{1500'}{60(5)}$ = 5 minutes

From Time - Intensity Curve for 10-year recurrence interval: i = 7.7 inches

Q_p = ciA = (0.75)(7.7)(9.4) = 54 cfs

From the location of this drainage area in relation to the other contributing areas, the runoff will have passed from the channel before water from the other two areas arrives in the channel. Therefore, the channel will be constructed to carry 70% of the combined discharges from Channels 1 and 2, or 110 cfs. This percentage was chosen because of the different Times of Concentration for the two areas.

From previous calculations for Channels 1 and 2, a channel with the following hydraulic dimensions will be constructed:

Channel Depth - H = 2.5 feet (includes 0.3' freeboard)
Side Slopes - z = 1v:2h
Channel Slope - S_o = 1.2%

Maxine Mine
Design of Diversion Channels, con't
Page 3

Channel 4 - Located south of Area 1 as shown on Map No. 405

Drainage Area - 10 acres
Approximate Cannel length - 1800 feet

Assume:
Maximum permissible channel velocity - 6 fps
Runoff Coefficient - c = 0.2

Time of Concentration, $T_c = \frac{L}{60V} = \frac{1800'}{60(6)} = 5$ minutes

From Time - Intensity Curve for 10-year recurrence interval: i = 7.7 inches

$Q_p = ciA = (0.2)(7.7)(10) = 15.4$ cfs

Try a channel with the following hydraulic dimensions:

b = 5 feet
z = 2
n = 0.025
S_o = 2%

From calculations, normal flow depth of water is, y_n = 0.5 feet at
V_n = 4.4 fps. OK!

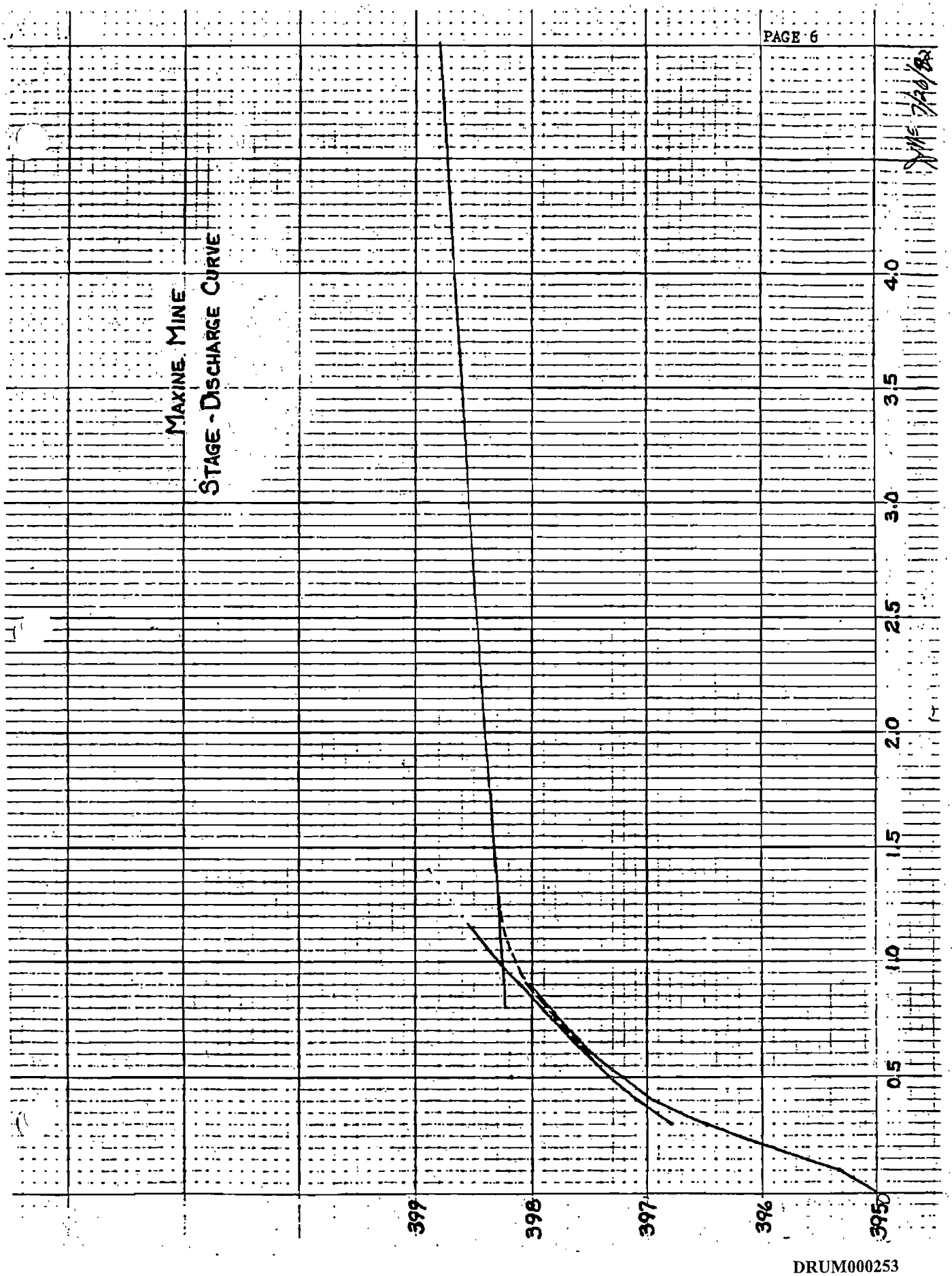
Design Parameters:

Channel Depth - H = 0.5' + 0.3' freeboard = 0.8'
Use H = 1.0 feet
Side Slopes - z = 1v:2h
Channel Slope - S_o = 2%

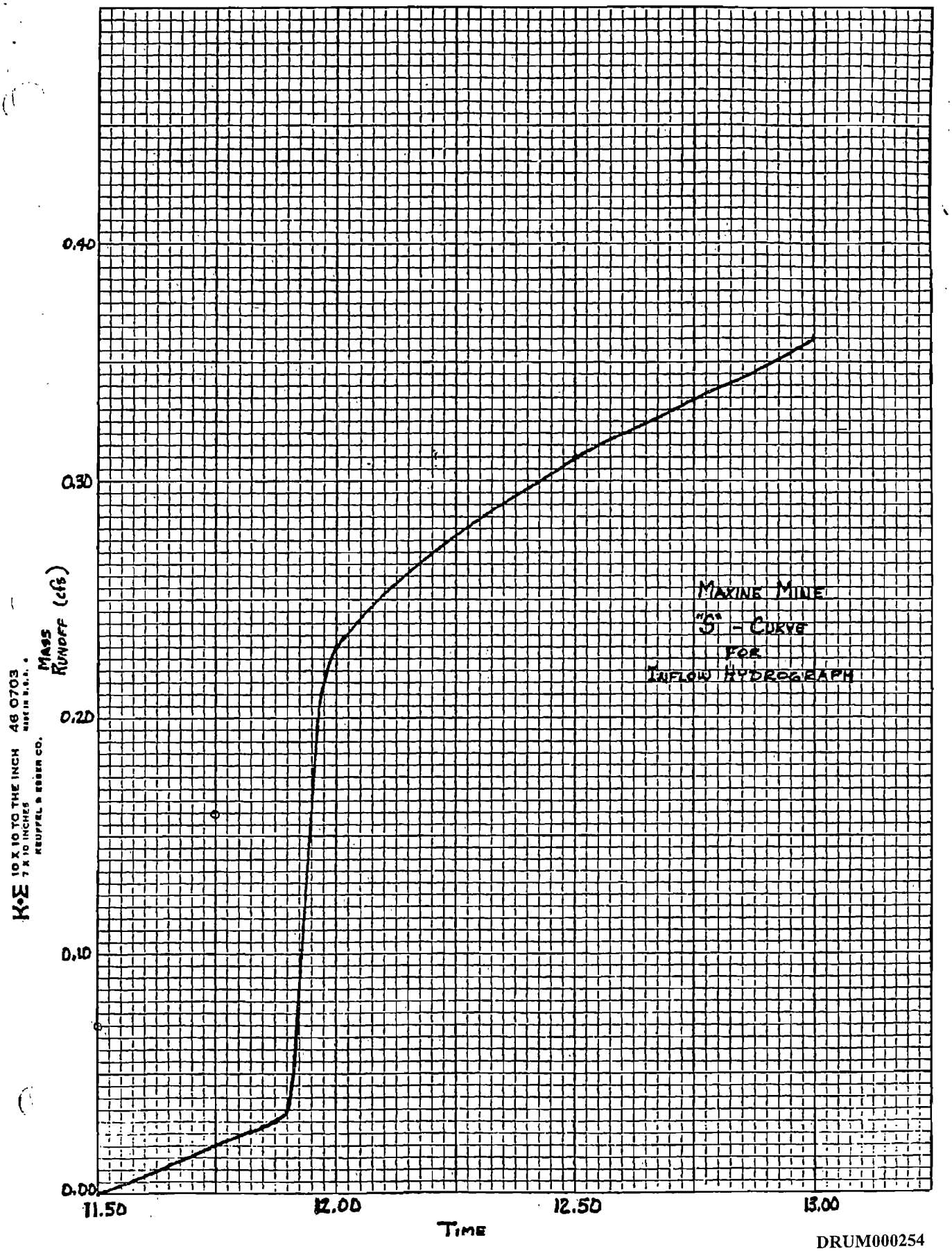
NOTE:

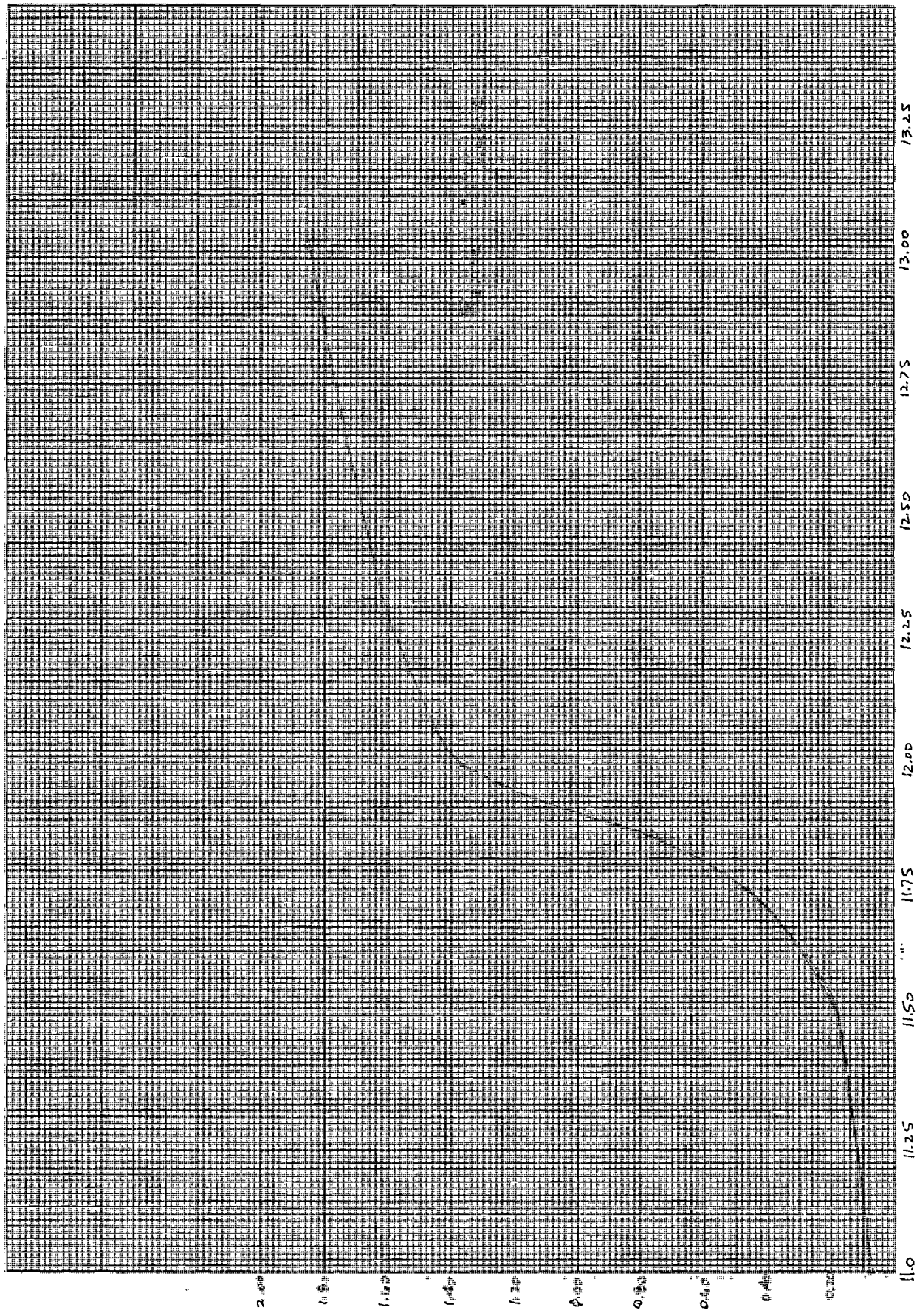
1. Procedures used in design of the diversion channels are based on methods developed by the Design Engineer and using hydraulic tables and charts available in SCS and DOT Design publications.

Jack L. McDuff, PE


PAGE 6
MAXINE MINE
STAGE - DISCHARGE CURVE
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
399
398
397
396
395.0

DRUM000253

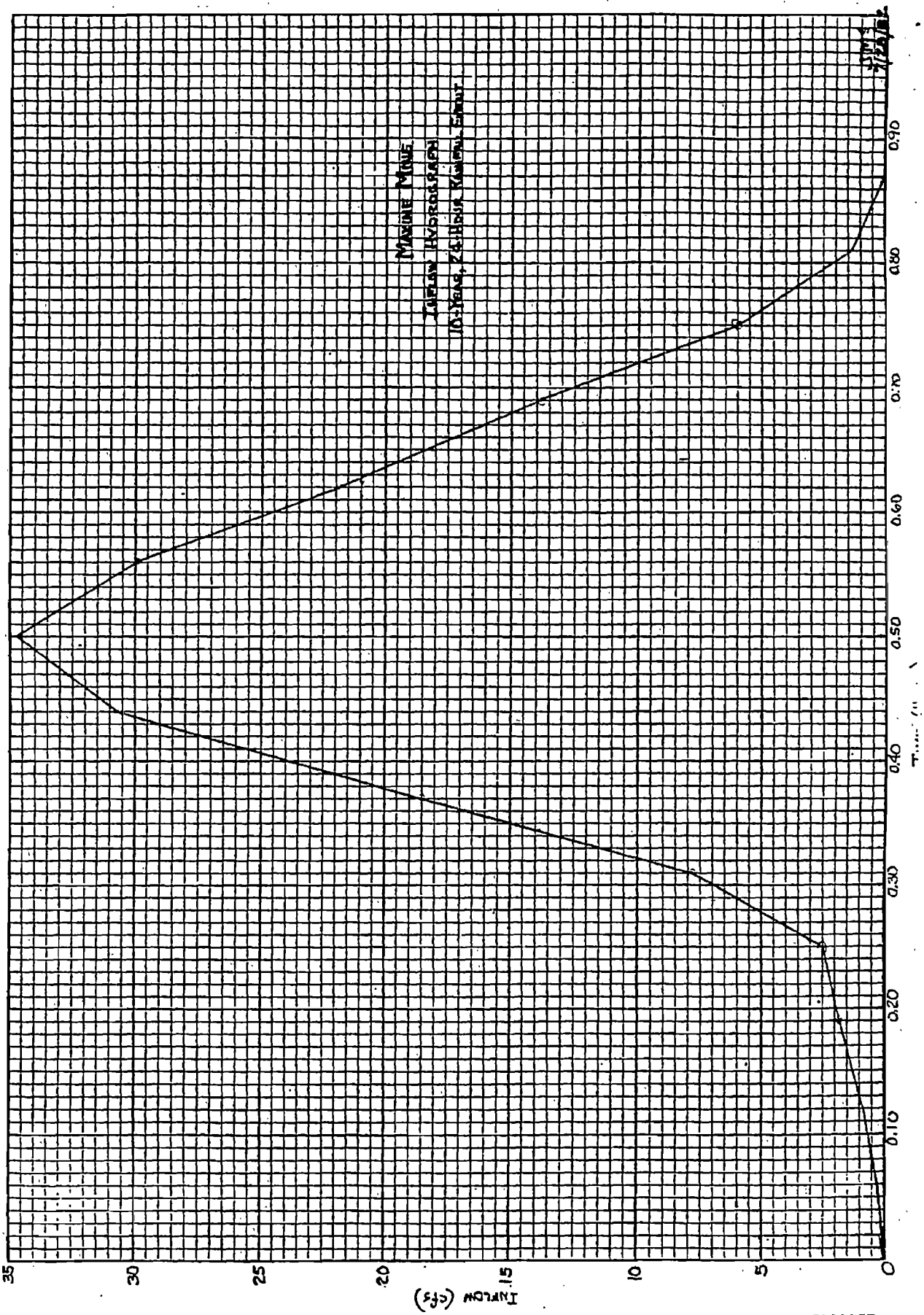

0.40
0.30
0.20
0.10
0.00
MASS RUNOFF (cfs)
11.50
12.00
12.50
13.00
TIME
MAXINE MINE
"S" - CURVE
FOR
INFLOW HYDROGRAPH
K+E 10 X 10 TO THE INCH 46 0703
7 X 10 INCHES
KEUFFEL & ESSER CO.



DRUM000255

TIME	0	0.06	0.12	0.19	0.25	0.31	0.37	0.44	0.50	0.56	0.62	0.69	0.75	0.81	0.87			
UNIT HYDRO	0	0.9	0.9	0.9	0.9	15.4	17.0	6.5	0									
EFFECTIVE RAINFALL																		
1/3	0	0.3	0.3	0.3	0.3	5.1	5.7	2.2	0									
2/3		0	0.6	0.6	0.6	0.6	10.3	11.3	4.3	0								
1			0	0.9	0.9	0.9	0.9	15.4	17.0	6.5	0							
0.8				0	0.7	0.7	0.7	0.7	12.3	13.6	5.2	0						
0.6					0	0.5	0.5	0.5	0.5	9.2	10.2	3.9	0					
0.4						0	0.4	0.4	0.4	0.4	6.2	6.8	2.6	0				
0.2							0	0.2	0.2	0.2	0.2	3.1	3.4	1.3	0			
	0	0.17	0.33	0.50	0.67	0.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50	2.67	
	0	13.4	16.5	24.7	31.9	15.5	13.4	6.2	0									
1/3	0	4.5	5.5	8.2	10.6	5.2	4.5	2.1	0									
2/3		0	8.9	11.0	16.5	21.3	10.3	8.9	4.1	0								
1			0	13.4	16.5	24.7	31.9	15.5	13.4	6.2	0							
0.8				0	10.7	13.2	19.8	25.5	12.4	10.7	5.0	0						
0.6					0	8.0	9.9	14.8	19.1	9.3	8.0	3.7	0					
0.4						0	5.4	6.6	9.9	12.8	6.2	5.4	2.5	0				
0.2							0	2.7	3.3	4.9	6.4	3.1	2.7	1.2	0			
	0	14.5	14.4	32.6	54.3	72.4	81.8	76.1	62.2	43.9	25.6	12.2	5.2	1.2	0	=	486.4	
RUNOFF HYDRO-GRAPH	0	0.3	0.9	1.8	2.5	7.8	18.5	30.7	34.7	29.9	21.8	13.8	6.0	1.3	0			

0
13.4
16.5
24.7



BY JMS DATE 7/27/82

MAXINE MINE

PRINCIPAL SPILLWAY HYDROGRAPH

JOB NO. PAGE 11

PAGE 1 OF 2

TIME (HRS.)	Δt (HRS.)	AV. RATE OF INFLOW Qi FOR Δt (cfs)	AVERAGE INFLOW (cf)	TRIAL RES. STORAGE EL. AT END OF Δt	SPILLWAY DISCH. AT TRIAL RES. STRG. EL.	AVERAGE RATE OF OUTFLOW (cfs)	AVERAGE OUTFLOW FOR Δt (cf)	INCREMEN. STORAGE Δs (cf)	TOTAL STORAGE (cf)	RESERVOIR ELEV. AT END OF Δt
0	0	0	0	395.0	0	0	0	0	332,000	395.0
0.10	0.10	0.75	270	395.0	0	0	0	270	332,270	395.0
0.20	—	1.95	702	395.0	0	0	0	702	332,972	395.0
0.30		7.0	2520	395.1	0.03	0.015	5.4	2514.6	335,486.6	395.1
0.40		23.8	8568	395.5 395.3	0.13 0.09	0.08 0.06	28.8 21.6	8539.2 8546.4	344,025.8 344,033.0	395.3 395.3
0.50		34.7	12492	395.6 395.7	0.15 0.16	0.12 0.125	43.2 45.0	12448.8 12447.0	356481.8 356480.0	395.7 395.7
0.60		23.9	8604	396.0 395.9	0.22 0.20	0.19 0.18	68.4 64.8	8535.6 8539.2	365015.6 365019.2	395.9 395.9
0.70		12.5	4500	396.1 396.0	0.23 0.22	0.215 0.21	77.4 75.6	4422.6 4424.4	369,441.8 369443.6	396.0 396.0
0.80		2.1	756	396.1	0.23	0.225	81.0	675	370,118.6	396.1
0.90		0	0	396.1	0.23	0.23	82.8	-82.8	370,035.8	396.1
1.0		0	0	396.1	0.23	0.23	82.8	-82.8	369,953.0	396.1
2.0	1.0	0	0	396.1	0.23	0.23	82.8	-82.8	369,870.2	396.1

BY JMS DATE 7/27/82

MAXINE MINE

PRINCIPAL SPILLWAY HYDROGRAPH

JOB NO. PAGE 12

PAGE 2 OF 2

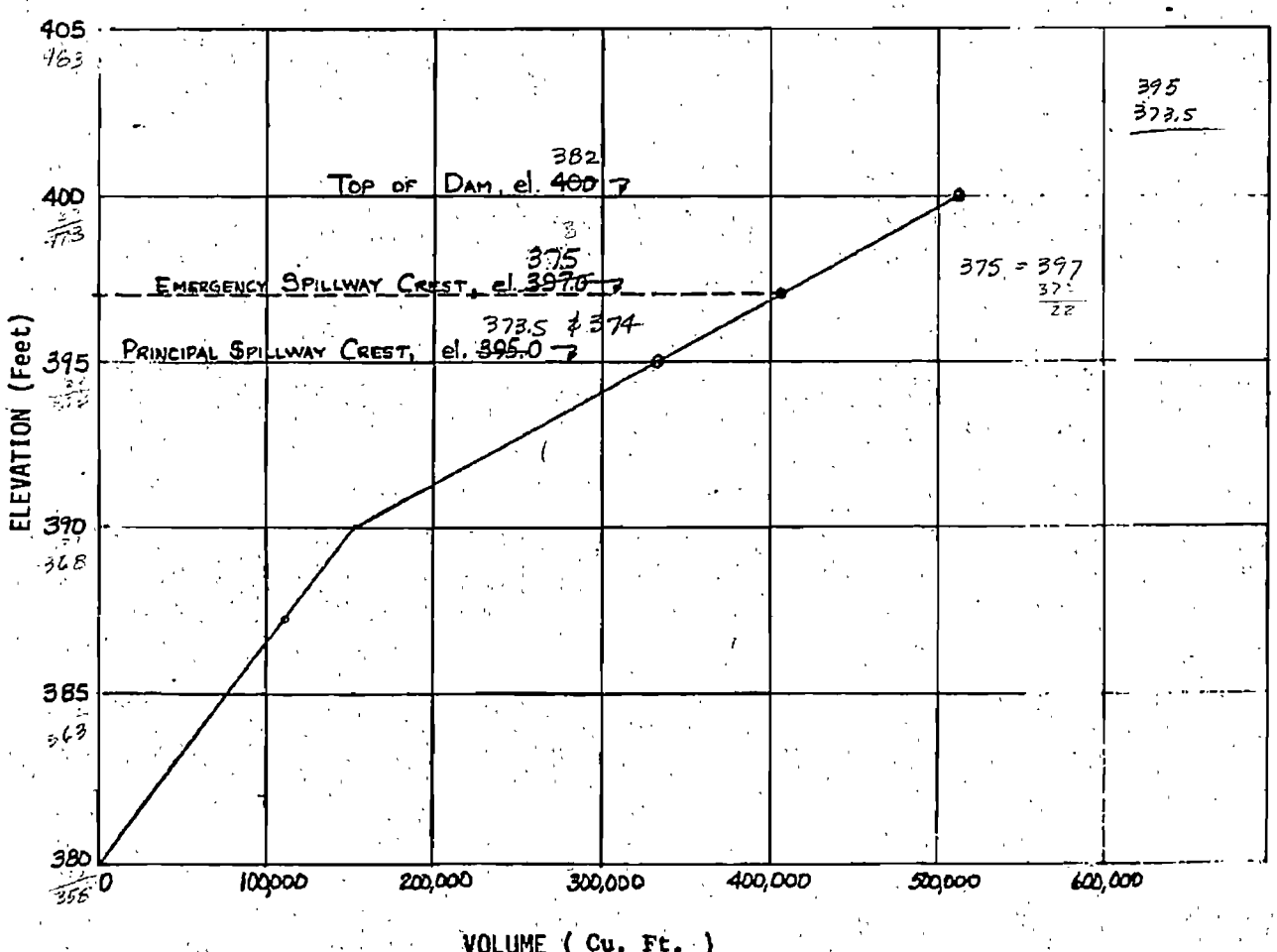
TIME (HRS.)	Δt (HRS.)	AV. RATE OF INFLOW Qi FOR Δt (cfs)	AVERAGE INFLOW (cf)	TRIAL RES. STORAGE EL. AT END OF Δt	SPILLWAY DISCH. AT TRIAL RES. STRG. EL.	AVERAGE RATE OF OUTFLOW (cfs)	AVERAGE OUTFLOW FOR Δt (cf)	INCREMEN. STORAGE Δs (cf)	TOTAL STORAGE (cf)	RESERVOIR ELEV. AT END OF Δt
3.0	1.0	0	0	396.1	0.23	0.23	82.8	-82.8	369787.4	396.1
4.0		0	0	396.1	0.23	0.23	82.8	-82.8	369704.6	396.1
5.0	— —	0	0	396.0 396.1	0.22 0.23	0.225 0.23	81.0 82.8	-81.0 -82.8	369623.6 369,621.8	396.1 396.1
10.0	5.0	0	0	395.9	0.20	0.215	3870.0	-3870.0	365,751.8	395.9
15.0		0	0	395.7 395.9 395.8	0.16 0.20 0.18	0.18 0.20 0.19	3240.0 3600.0 3420.0	-3240.0 -3600.0 -3420.0	362,511.8 362,151.8 362,331.8	395.9 395.8 395.8
20.0		0	0	395.6 395.8	0.15 0.18	0.165 0.18	2970.0 3240.0	-2970.0 -3240.0	359,361.8 359,091.8	395.8 395.8
25.0	...	0	0	395.6 395.7	0.15 0.16	0.165 0.17	2970.0 3060.0	-2970.0 -3060.0	356,121.8 356,031.8	395.7 395.7
30.0		0	0	395.6	0.15	0.155	2790	-2790	353,241.8	395.6
35.0		0	0	395.5	0.13	0.14	2520	-2520	350,721.8	395.5
40.0		0	0	395.4 395.5	0.11 0.13	0.12 0.13	2160 2340	-2160 -2340	348561.8 348381.8	395.5 395.5
50	10.0	0	0	395.3 395.4	0.09 0.11	0.11 0.12	3960 4320	-3960 -4320	344421.8 344061.8	395.4 395.3

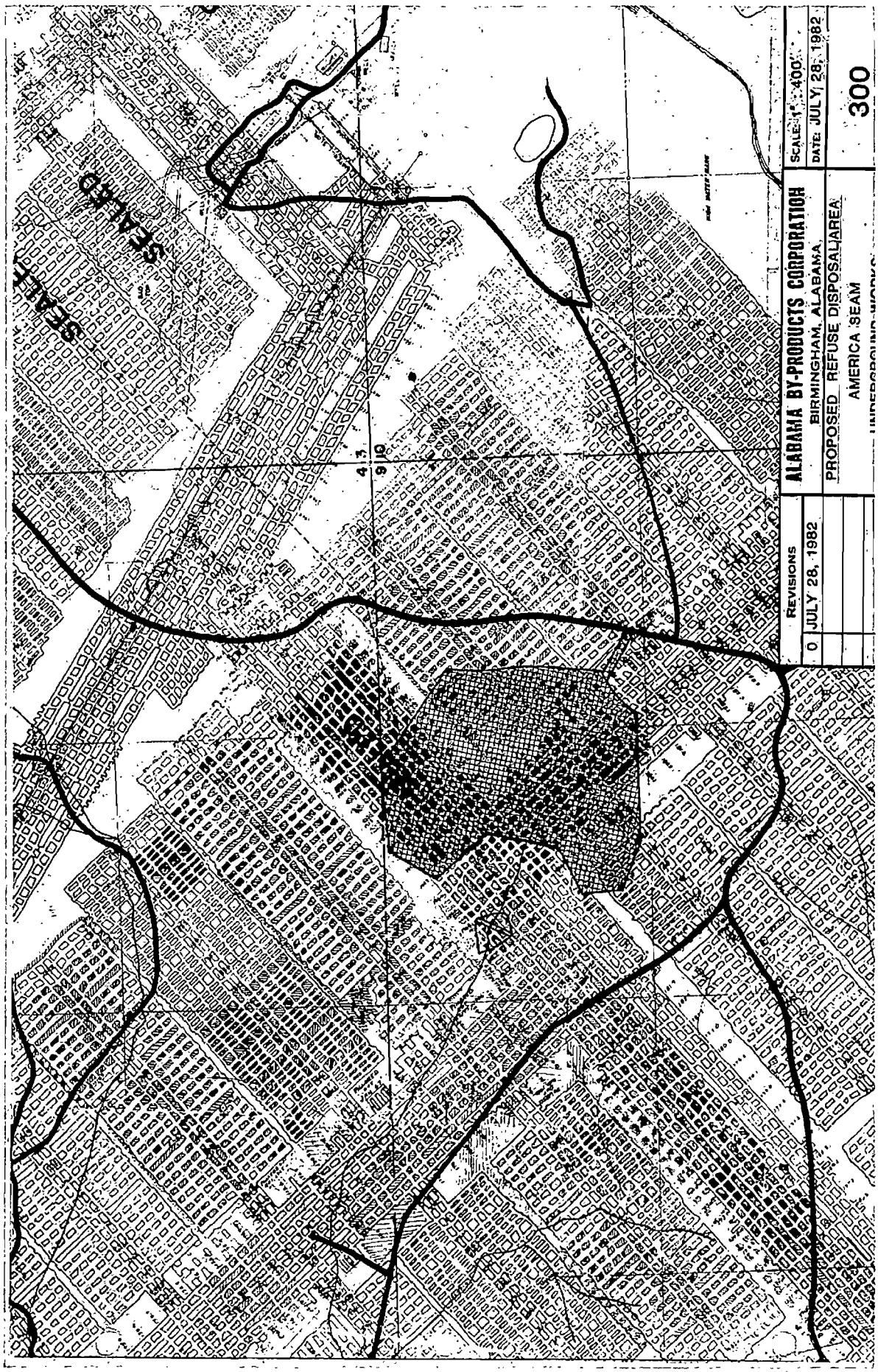
BY JMS DATE 7/27/82 SUBJECT MAXINE MINE SHEET NO. 13 OF
CHKD. BY DATE SEDIMENT CONTROL FACILITY 023 JOB NO.

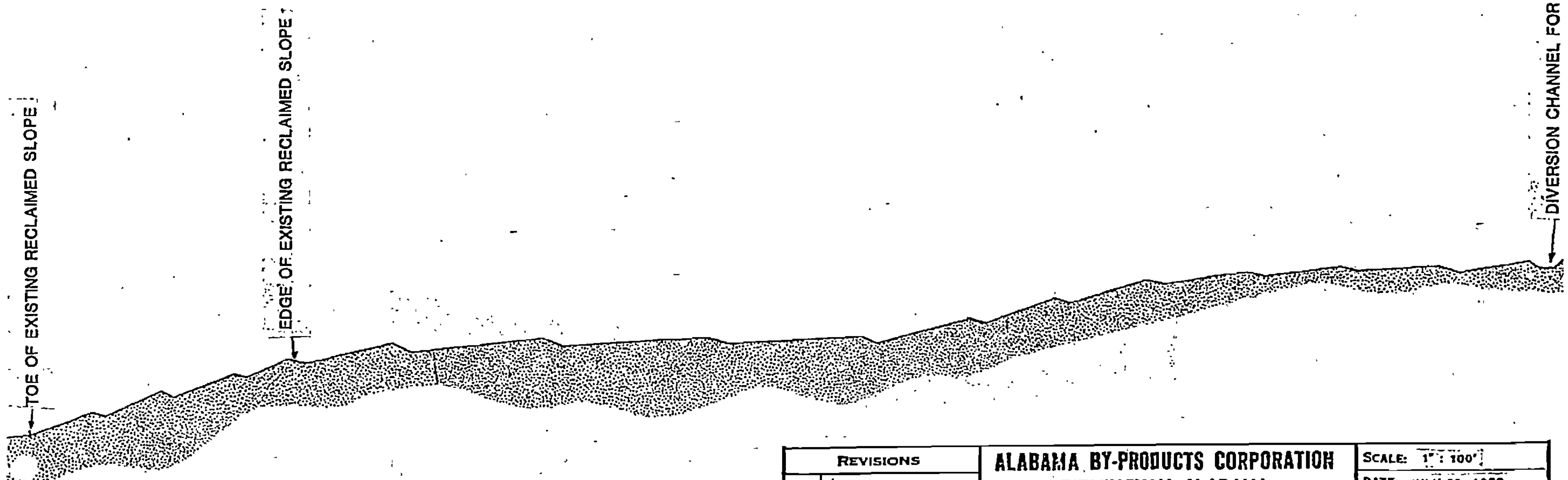
STORAGE COMPUTATIONS

Elevation (Feet)	Area (Sq. Ft.)	Area (Ac.)	Avg. Area (Sq.Ft)	Interval (Feet)	Storage (Cu. Ft.)	Storage (Cu. Ft.)
380	6400					0
			15200	10	152000	
390	24000					152000
			36000	10	360000	
400	48000	--				512000
375	0	0				0
			0.08	5	0.40	
380	6400	0.15				0.40
			0.35	10	3.50	
390	24000	0.55				3.90
			0.83	10	8.30	
400	48000	1.10				12.20

ELEVATION - STORAGE CURVE

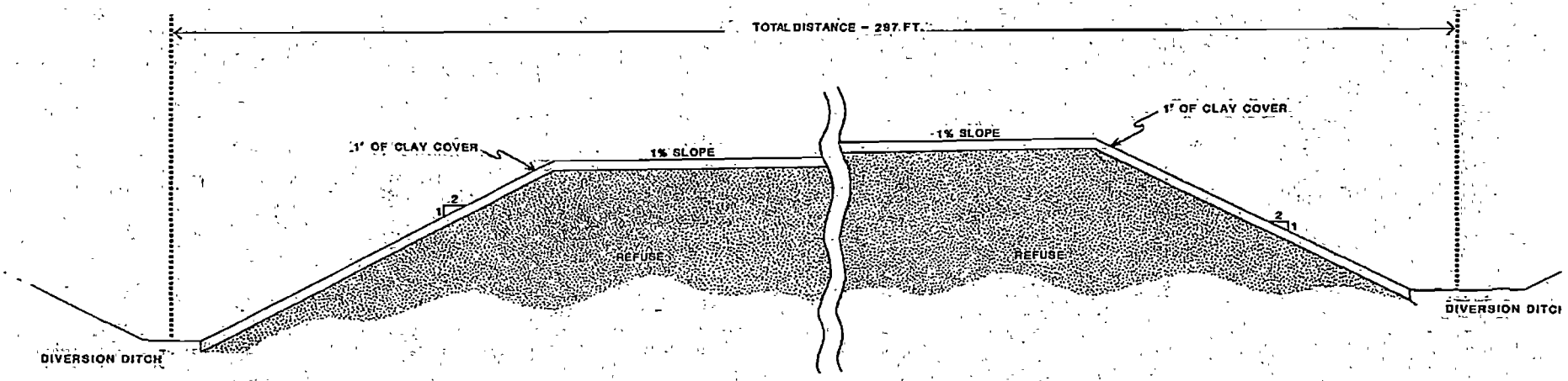



ALABAMA BY-PRODUCTS CORPORATION
BIRMINGHAM, ALABAMA
PROPOSED REFUSE DISPOSAL AREA
AMERICA SEAM
REVISIONS
0 JULY 28, 1982
SCALE: 1" = 400'
DATE: JULY 28, 1982
300
DRUM000261



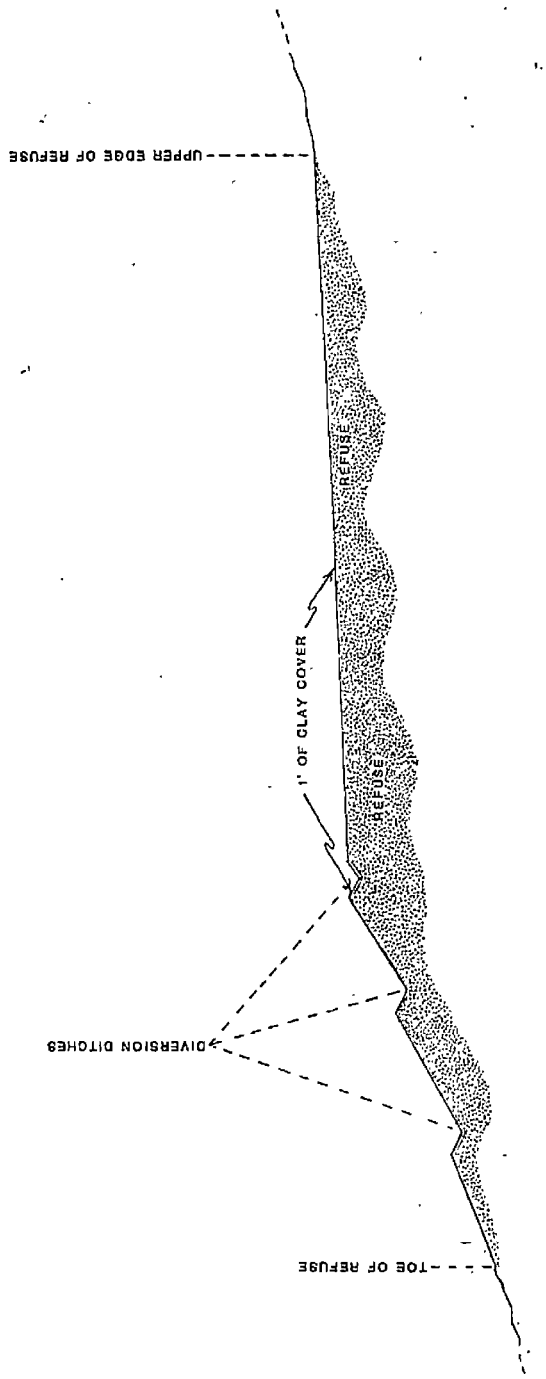
REVISIONS		ALABAMA BY-PRODUCTS CORPORATION BIRMINGHAM, ALABAMA	SCALE: 1" : 100'
0	JULY 29, 1982		DATE: JULY 29, 1982
		PROPOSED PROFILE OF WASHER REFUSE DISPOSAL AREA	300-A-1

DRUM000262



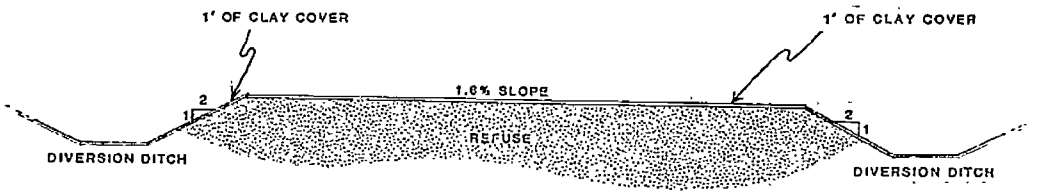
REVISIONS		ALABAMA BY-PRODUCTS CORPORATION	SCALE: 1" = 10'
0	JULY 29, 1982	BIRMINGHAM, ALABAMA	DATE: JULY 29, 1982
		PROPOSED CROSS SECTION OF WASHER REFUSE DISPOSAL AREA	300-A-2

DRUM000263



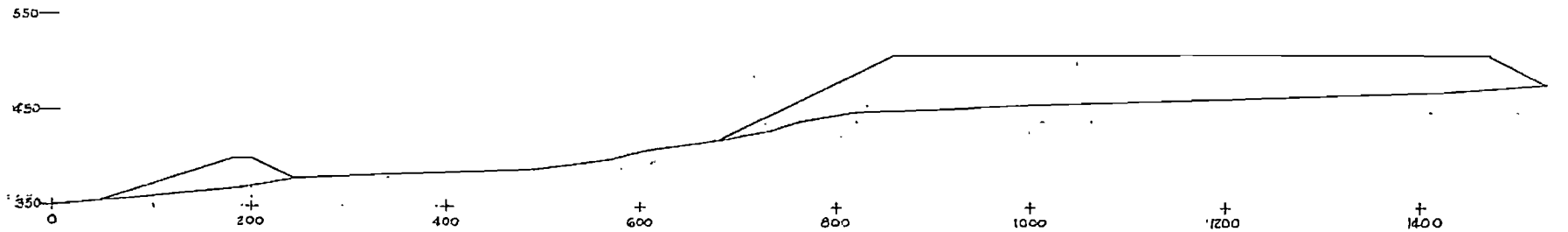
REVISIONS		ALABAMA BY-PRODUCTS CORPORATION	SCALE: 1" = 60'
0	JULY 29, 1982	BIRMINGHAM, ALABAMA	DATE: JULY 29, 1932
		PROPOSED PROFILE OF COARSE REFUSE DISPOSAL AREA	300-A-3

DRUM000264

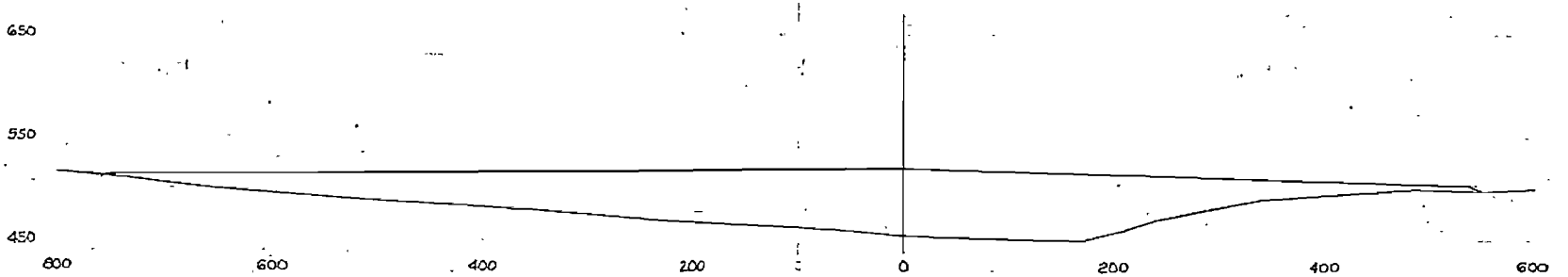


REVISIONS		ALABAMA BY-PRODUCTS CORPORATION	SCALE: 1" : 50'
0	JULY 29, 1982	BIRMINGHAM, ALABAMA	DATE: JULY 1, 1982
		PROPOSED CROSS SECTION OF COARSE REFUSE DISPOSAL AREA	300-A-4

DRUM000265



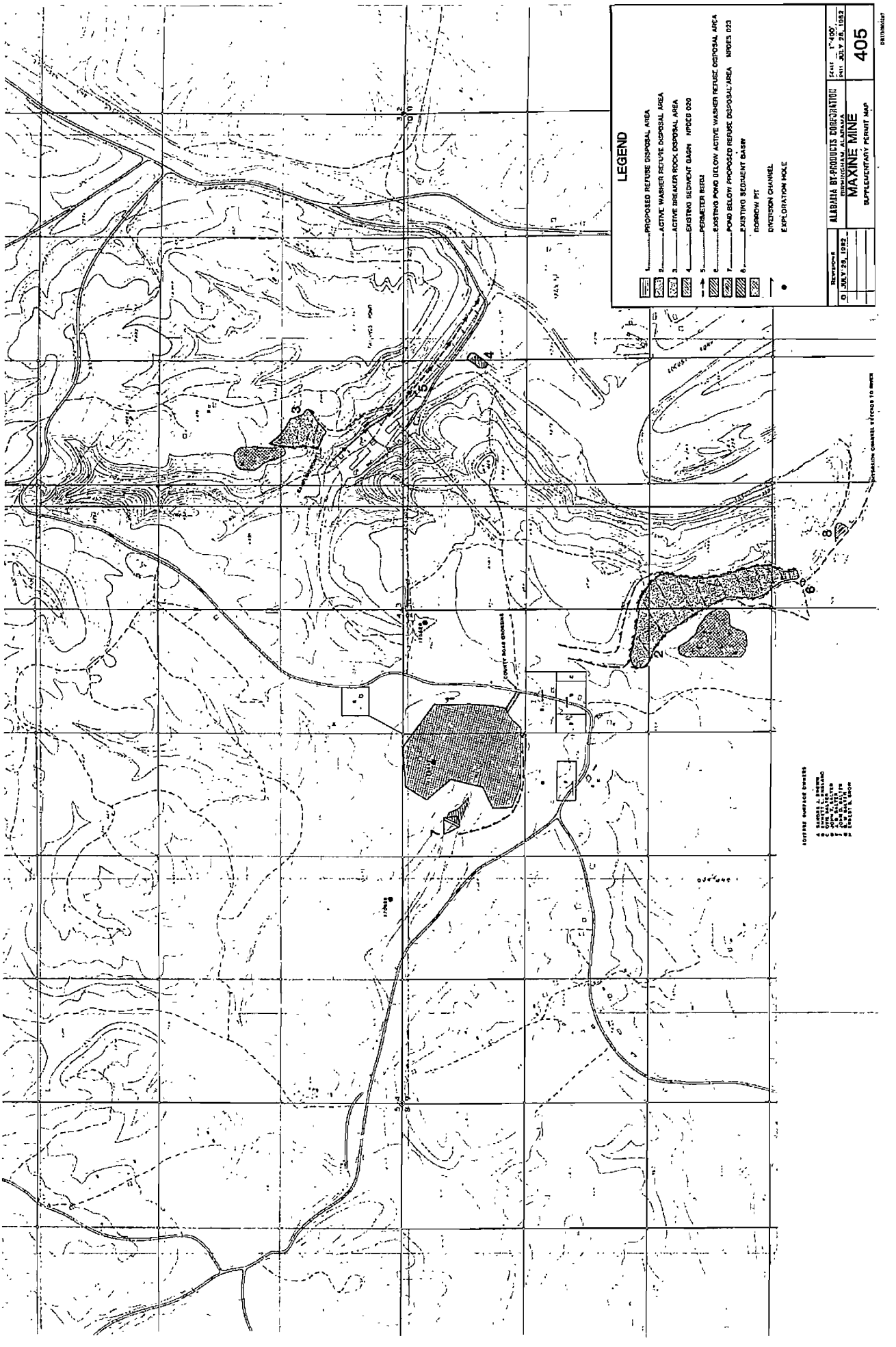
LONGITUDINAL SECTION
SECTION A-A



TRANSVERSE SECTION
SECTION B-B

REVISIONS	ALABAMA BY-PRODUCTS CORPORATION BIRMINGHAM, ALABAMA	SCALE: 1"=200 H. & V DATE: JULY 21, 1982
	MAXINE MINE PROPOSED REFUSE DISPOSAL SITE. LONGITUDINAL & TRANSVERSE SECTIONS	300-B

DRUM000266


LEGEND
1 PROPOSED REFUSE DISPOSAL AREA
2 ACTIVE WASHER REFUSE DISPOSAL AREA
3 ACTIVE BREAKER ROCK DISPOSAL AREA
4 EXISTING SEDIMENT DAM NPDES 020
5 PERIMETER BERM
6 EXISTING POND BELOW ACTIVE WASHER REFUSE DISPOSAL AREA
7 POND BELOW PROPOSED REFUSE DISPOSAL AREA NPDES 023
8 EXISTING SEDIMENT BASIN
BORROW PIT
DIVERSION CHANNEL
EXPLORATION HOLE
Revisions
0 JULY 28, 1982
ALABAMA BY-PRODUCTS CORPORATION
BIRMINGHAM, ALABAMA
MAXINE MINE
SUPPLEMENTARY PERMIT MAP
Scale 1"=400'
Date JULY 28, 1982
405

ALABAMA BY-PRODUCTS CORPORATION
RECORD OF DIAMOND DRILL HOLE

Drill Hole No.: 170628

Location: NE¼ - NE¼ Section 9-17-6

Drilled By: Joy Manufacturing Company

Driller: Sam Barley

Size of Core: 2-1/8 inches (NX)

Started: June 21, 1951 Completed: June 26, 1951

	Thickness of Strata Ft.	In.	Distance from Surface Ft.	In.	Elevation Feet
			0	0	444.00
Surface	1' -	0"	1' -	0"	
Sandstone	7' -	6"	8' -	6"	436
Shale with Sandstone bands	14'-	0"	22' -	6"	421.5
Sandstone	20'-	0"	42' -	6"	
Sandstone with shale bands	10'-	6"	53' -	0"	391
Shale with sandstone bands	124'-	0"	177'-	0"	~~220~~ 267
Blue Shale	2' -	6"	179'-	6"	
Hard-Sandy Shale	1' -	0"	180'-	6"	
Dark Blue Shale	13'-	0"	193'-	6"	
Shale with Sandstone bands	9' -	6"	203'-	0"	241
Sandstone	1' -	0"	204'-	0"	240.00
Coal)	0' -	5"	204'-	5"	
Parting)	0' -	1½"	204'-	6½"	
Coal) PRATT	0' -	2½"	204'-	9"	
Parting)	0' -	1½"	204'-	10½"	
Coal)	0' -	5½"	205'-	4"	
Parting) Seam	0' -	3"	205'-	7"	
Coal)	0' -	7"	206'-	2"	
Parting)	0' -	1"	206'-	3"	
Coal)	0' -	11"	207'-	2"	236.83
Fireclay	0' -	10½"	208'-	0½"	
Coal	0' -	2¼"	208'-	03/4"	
Fireclay	1' -	2"	209'-	2-3/4"	
Coal	0' -	0-3/4"	209'-	3½"	
Fireclay	0' -	7½"	209 -	11"	
Coal	0' -	1"	210'-	0"	234
Fireclay	2' -	0"	212'-	0"	232
Soft blue shale	2' -	3"	214'-	3"	229.75
Coal Fireclay Seam	1' -	4"	215'-	7"	228.42
Fireclay	1' -	5"	217'-	0"	227
Shale	4' -	0"	221'-	0"	223
Sandstone	10'-	0"	231'-	0"	213
Shale with Sandstone bands	7' -	0"	238'-	0"	
Blue Shale	8' -	0"	246'-	0"	198.00

110628

		Thickness of Strata Ft.	In.	Distance from Surface Ft.	In.	Elevation Feet
Coal)						
Parting)		1'	- 5"	247'	- 5"	
Coal)		0'	- 1"	247'	- 6"	
Parting)	AMERICAN	0'	- 4"	247'	- 10"	
Coal)		0'	- 1"	247'	- 11"	
Parting)	SEAM	0'	- 1"	248'	- 0"	
Coal)		0'	- 1"	248'	- 1"	
Parting)		0'	- 7"	248'	- 8"	
Coal		0'	- 1"	248'	- 9"	
Parting)		0'	- 03/4"	248'	- 9-3/4"	
Coal)		0'	- 0¼"	248'	- 10"	
Parting)		0'	- 7½"	249'	- 5⅛"	
Coal)		0'	- 2"	249'	- 7⅛"	
Parting)		0'	- 1"	249'	- 8⅛"	
Coal)		0'	- 1"	249'	- 9½"	
Sandy Fireclay		1'	- 0½"	250'	- 10"	193.17
Sandstone		1'	- 6"	252'	- 4"	191.67
		0'	- 4"	252'	- 8"	
				Bottom		

(Crouted to Surface June 26, 1951)

Copied:

December 15, 1954
Frank J. Imuler